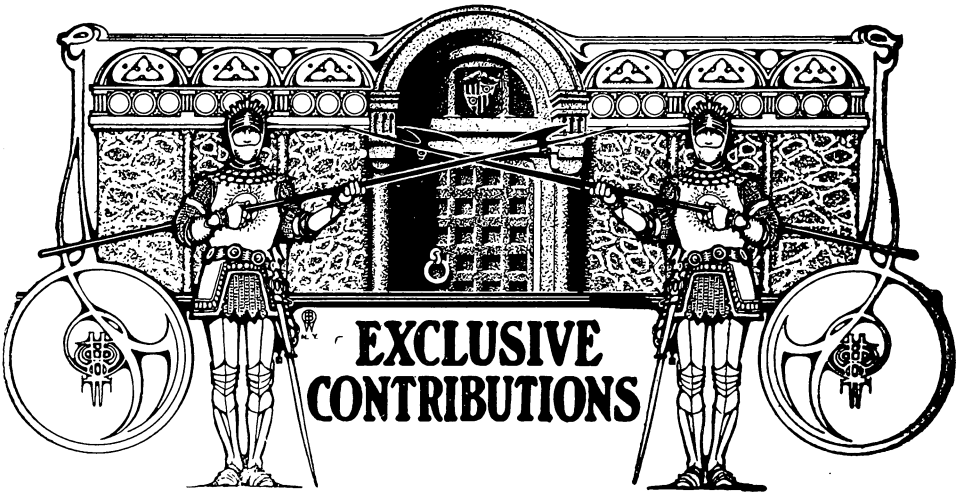


Methods of Filling Teeth with Gold Inlays.*

By Dr. Thos. P. Hinman, Atlanta, Ga.

Disto-Lingual Cavities in Cuspids.

These cavities are among the most difficult that the operator is called upon to fill with cohesive gold, but prove quite simple when inlaid with gold or porcelain.

When a cavity exists on the distal surface of a cuspid and it is to be inlaid with gold, the cavity preparation is as follows:

The tooth should be wedged and when sufficient separation has been obtained, cut away the disto-lingual enamel sufficiently to give easy access to the cavity. With a large round bur in the right angle attachment, remove all the decay and flare the walls lingually. With a small right angle fissure bur, cut two shallow grooves at the incisal and cervical border of the cavity, between the enamel and pulp; these grooves are cut with the side of the fissure bur and are made to come through the lingual enamel.

The flare from the labial to the lingual surface forms a perfect dove-tail and anchorage for the filling. Polish the margins with a cuttle-fish disk and the cavity is ready for the matrix. (Fig. 30.)

Pass the piece of annealed inlay gold well up between the cavity and the adjoining tooth, being sure that the gold laps the cervical border of the cavity. Press the matrix into the cavity with a pledget of wet cotton held in the pliers, leaving the cotton in position while the gold is burnished to the labial margin, which it is allowed to slightly lap.

Too wide a lap here is objectionable, as it will interfere with the removal of the matrix from the cavity. Remove the matrix and trim approximately, leaving a wide lingual lap. This is done to facilitate handling.

Return to the cavity and reburnish the margins only. (Fig. 31.) Remove the matrix from the tooth and invest in sump; being sure that the matrix is level with the base of the investments, for if the matrix is low at one end, the gold will flow to that point and produce a lump, where it is not desired. (Fig. 32.)

Heat up investment from below and proceed to fill with 20 K. solder, building the desired contour by sweating on the last piece of solder. Remove the inlay from the investment and pickle. Wash off the acid,

FIG. 30.

FIG. 31.

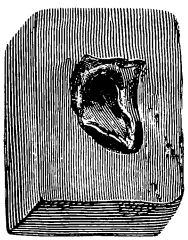


FIG. 32.

FIG. 33.

trim and polish the approximal surface. Roughen the inner surface with a small bur.

Dry the cavity and protect it from moisture. It has been found good practice to wipe all cavities with absolute alcohol before cementation, as the alcohol cleanses the cavity of any foreign matter that may be clinging to the walls, as well as removing the moisture. Mix the cement to the constituency of thick cream and smear the cavity, covering all its walls with the thin cement. Carry the inlay to the cavity and drive to place. tying it in with floss silk, using only the first tie of a surgeon's knot. Burnish the cervical and labial wall before the cement has set.

When the cement has thoroughly hardened, grind and polish to the margins, finishing the cervical border with strips. (Fig. 33.)

Inlays in Cuspids Requiring Contour.

Where a cavity exists on the mesial or distal surface of a cuspid and it is necessary to cut away the labial enamel to a considerable extent, the cavity preparation for an inlay is as follows:

Remove the decay from the cavity and cut away the lingual enamel more than the labial so that the resultant joint between

the inlay and tooth will be a bevel lap instead of a butted joint. Inlays formed thus offer greater mechanical resistance to the forces that tend to dislodge them, than any other method of cavity preparation known to the author.

The basal wall is cut flat with the end of a square end fissure bur, a shallow groove being cut in this floor to insure the stability of the inlay. A doll head anchorage is made in the lingual enamel beginning about two-thirds the distance from the gingival border to the incisal surface of the cavity. This doll head extends distally in a mesial cavity and is of sufficient breadth and depth to give a firm anchorage for this portion of the filling.

FIG. 34.

a

b

FIG. 35.

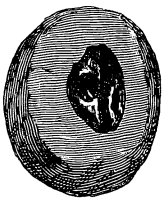


FIG. 36.

FIG. 37.

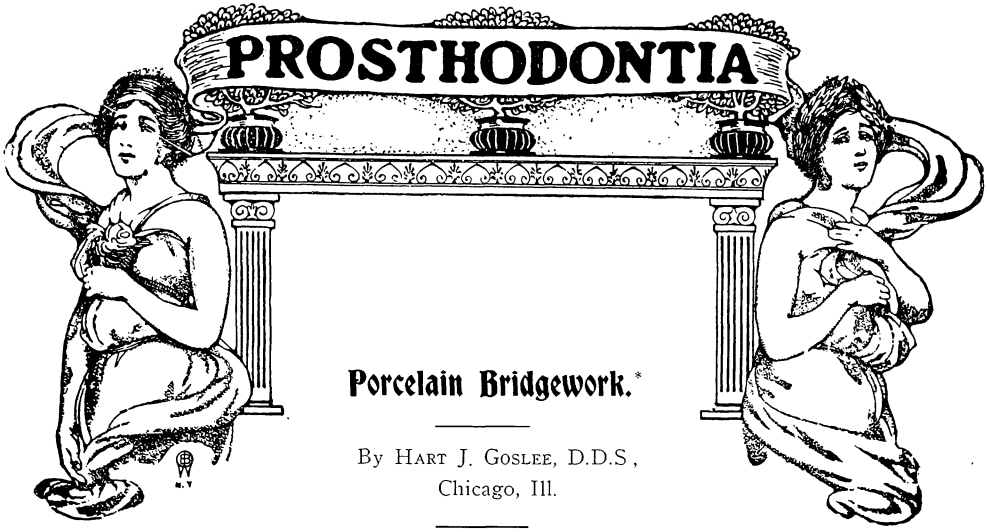
It is not always necessary to make this doll head anchorage, but the operator may rely on the groove in the basal wall and the adhesion of the cement to the cavity and inlay, to securely hold the inlay in place. The enamel margins are then polished with a cuttle-fish disk, the labial enamel is beveled from without, inward, so as to give in the finished inlay a lapped joint. (Fig. 34.)

The matrix is made as heretofore described and is thickened with 22 K. solder, returned to the cavity and the margin reburnished. (Fig. 35 a.)

An impression is taken in modeling compound and a model run in sump. The lost parts are restored with hard wax and covered accurately to conform to a correct contour.

The tooth is cut from the model and the labial surface of the wax is covered with 1-1000 pure gold. This contour gold should be burnished to a perfect adaptation with the wax, being carried far enough around the approximal surface to give the needed contour. (Fig. 35 b.)

The tooth is invested labial surface downward in sump. The wax is washed out and the matrix flushed. (Fig. 36.) Proceed to fill level with 20 K. solder. Remove the inlay from the investment, pickle in an acid bath, trim approximately, partially polish and cement in position, finishing as usual. (Fig. 37.)



Porcelain Bridgework.*

By Hart J. Goslee, D.D.S,
Chicago, Ill.

When thus completed the porcelain may then be built up, carved and baked, as desired, and when this part of the piece has been entirely finished it should be replaced upon the model, attached in its proper relation to the gold crown, with hard wax, and the whole then carefully removed, invested and soldered with 18-karat solder.

As the space between the porcelain part of the piece and the gold crown, which is to be filled with solder, is necessarily small (Fig. 354 B), the soldering may be facilitated by allowing the latter to be more or less freely exposed in the investment, and all danger of fracturing the porcelain, or of encountering any difficulties in the procedure will be overcome by slowly and thoroughly heating the case before attempting to fuse the solder. The result obtained in the completed case is shown in Fig. 354.**

Dowel Crowns as Abutment Pieces.

Because of the desirability of employing some form of porcelain crown as abutment pieces on all of the ten anterior teeth, and of the usual difficulty in observing such cosmetic requirements, which apply particularly to the construction of *bicuspid* crowns, the typical form of porcelain crown, supplemented by provision for admitting of attachment with solder, will be found most artistic and practicable.

* * The above two paragraphs were accidentally omitted from the last issue, and refer to illustrations therein —Ed.

Such a provision may be made, and such crowns may be used in preference to gold ones, or even to gold ones with porcelain facings, with almost equal assurances of success and permanency by simply increasing the depth and thickness of the platinum extension upon the lingual edge of the cap, which has been previously recommended and illustrated in connection with the construction of single bicuspid crowns, though the principle is also equally applicable to the construction of a crown for molars, cuspids, or incisors, or for any tooth where the use of porcelain may be regarded as safe, and where it may be desirable to avoid the presence of gold cusps or backings for cosmetic reasons.

When it seems warrantable to employ such a crown as an abutment piece the entire cap should be made of not thinner than 28 ga. platinum,

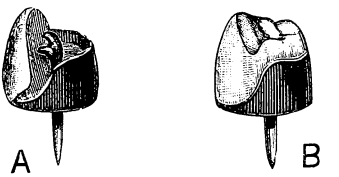


Fig. 355.

and the lingual extension, which is added at the time of soldering the facing, should be of at least the same thickness, and as wide or deep on the approximal side, presenting toward the dummy or dummies which are to be subsequently attached, as the occlusion will admit. (Fig. 355 A.)

If this extension is well reinforced with platinum solder, when the crown is then baked and completed, simple strength and opportunity for attachment with solder is thereby afforded, and a most artistic abutment piece is made possible. (Fig. 355 B.)

When thus completed it should be placed in position in the mouth together with the other abutment pieces, and the "bite" and impression secured, when the bridge may be assembled and soldered as usual.

All Porcelain Dummies.

Most of the advantages to be obtained in porcelain bridgework together with the elimination of the *necessity* for the employment of a saddle, and combined with the advantages offered by gold, may be achieved in a most practicable and highly esthetic manner by the employment of Brewster's bridge teeth, or of similar types of porcelain dummies, in conjunction with the above style of crown for the anterior abutment pieces, and gold telescope crowns for posterior attachments,

and it is safe to say that this combination forms a type of construction which is more generally applicable than almost any other, and which offers opportunity for obtaining the very acme of artistic and mechanical achievement in the line of bridge construction.

Fig. 356 shows a typical case of this kind; two other cases, in one of which a porcelain crown on the *cuspid* serves as the anterior anchorage, were previously illustrated in connection with the detail incident to the use of this class of porcelain "dummies" in Fig. 321.

Making Porcelain Blocks.

Because of the difficulty of obtaining ready-made gum blocks which may be suitable to the requirements and variations so frequently de-

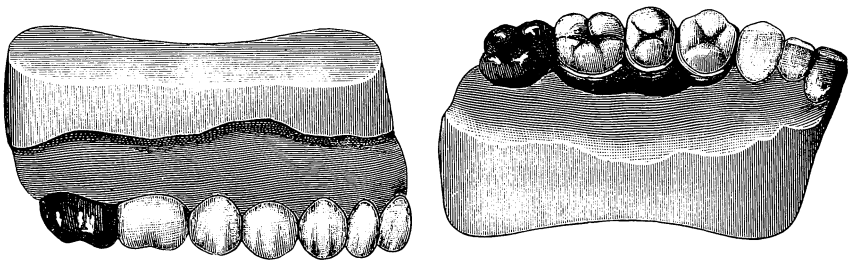


Fig. 356.

manded by the extent of absorption and the type of tooth, and which may even then be successfully attached to any form of abutment pieces for "fixed" bridges by means of soldering, the construction by the dentist of special pieces which will meet the combined requirements is not infrequently desirable.

This may be accomplished with comparative ease by first obtaining good models with the caps or abutment pieces in position, and then selecting suitable long-pin facings for the entire case. In anterior cases where no saddle is required these should be ground to the desired adjustment and the separate crowns then completed, after which the intermediate facings which are to constitute the desired block should be assembled with hard wax, removed from the model, and invested. They should now be united by means of a connecting bar of about 16 g. round iridio-platinum wire, placed immediately beneath the pins, and attached with 25 per cent. platinum solder, and at the same time provision for subsequently soldering the finished piece to the other part of the bridge should be made by attaching a small piece of 28 g. platinum plate to each end of the connecting bar. (Fig. 357 A.)

When thus assembled the piece may then be finished with porcelain and the required adaptation and conformation obtained by burnishing platinum foil over the surface of the model, and building the porcelain down to it. When completed, the platinum foil may be stripped off and the piece then placed in position on the model, removed in its proper relation to the attachments, invested and soldered with 18 K. solder. (Fig. 357 B.)

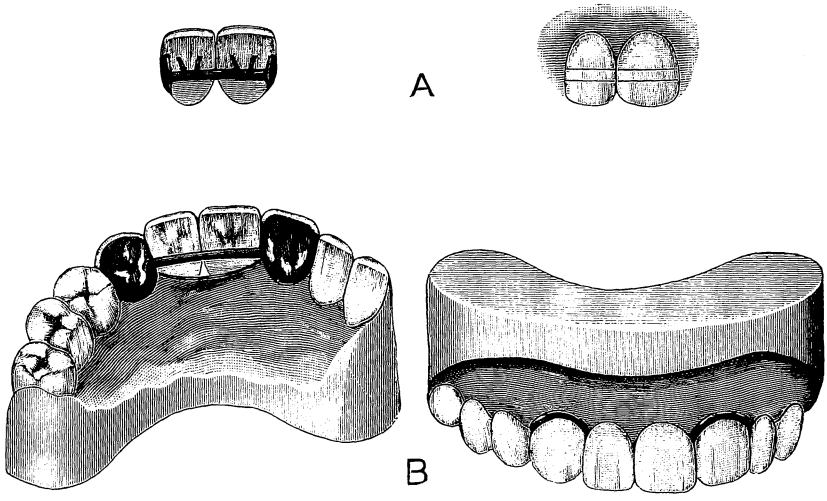


Fig. 357.

The same procedure applies also to the construction of blocks where the employment of a saddle may be indicated by the requirements of occlusion or extensive restoration. In building such blocks, however, the saddle should be adapted in the prescribed manner and then attached to the facings at the time of their assemblage with solder. Fig. 358 illustrates the typical application of a section constructed in this manner.

Building, Carving and Baking.

Whilst the details incident to the manipulation and fusing of porcelain have been elsewhere considered at some length, their application to the construction of bridgework in particular requires special emphasis.

As soon as the metal substructure has been removed from the investment after the final soldering, it should be treated to the acid bath and allowed to remain therein long enough to insure the thorough removal of all particles of flux, investment material, etc., and then washed in warm water to remove the acid.

All sharp edges of metal, and projecting ends of pins throughout the piece should now be finished down with small carborundum stones, used in the engine, and then with disks, until *smooth* and *nicely rounded,* when the metal substructure is ready for the porcelain. Failure to observe this detail will be apt to result in unnecessarily diminishing the strength of the finished piece, or in the appearance of small checks in the porcelain near its junction with the substructure, both of which may be attributed to the presence of sharp angles or edges of metal.

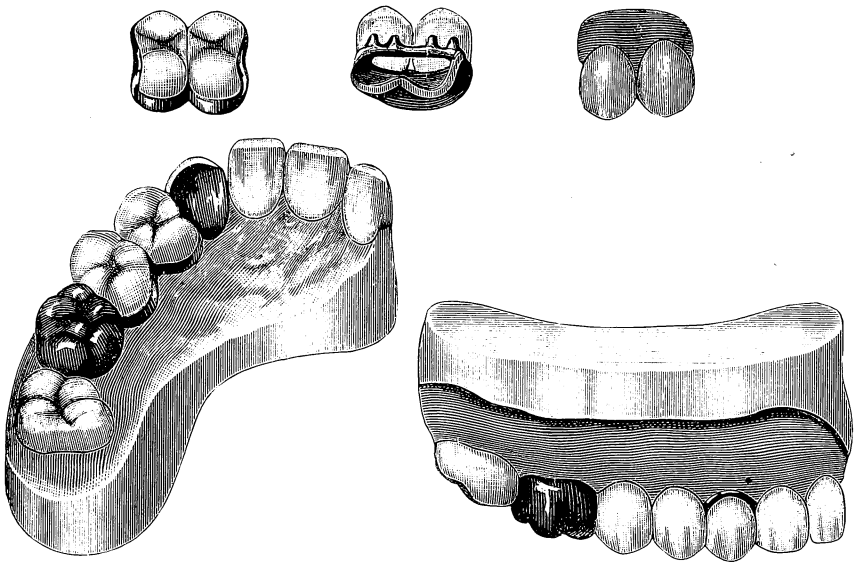


Fig. 358.

Building Body.

When thus finished and again washed thoroughly in order to remove debris, the piece should be grasped in a small pin-vise and the porcelain body, mixed with distilled water to as thick a consistency as it may be used, and thoroughly *spatulated,* then applied and carefully worked down into the most minute crevice. To obtain the maximum of strength in the fused porcelain the "body" should be *packed* as thoroughly as possible and air spaces must be avoided. As this procedure is continued and the piece is gradually built up to the desired form, the surplus moisture may from time to time be removed with a small piece of linen or blotting paper held between the thumb and finger, some degree of pressure being used.

When ample proportions to admit of shaping to the required conformation obtain, the mass may then be passed over a flame, or held near the heated furnace for a few moments until dry enough to admit of carving nicely without crumbling.

Carving. With a suitable instrument, such as has been previously illustrated in the chapter on Porcelain Crowns, the "body" should now be given definite form, and carved until each tooth is more or less distinctly formed, and until the desired occlusion and general outline for the finished piece is obtained.

This may be observed by carefully removing the piece from the pin-vise and placing it upon the model, on the articulator, and in the event of the "body" becoming too dry to be handled it may be slightly moistened with water by means of a small brush.

When the piece has been suitably carved it should then be noted that *no thin frail edges* of porcelain *overlap upon the metal,* as such parts will invariably fracture in cooling, or be broken off either before, during or soon after mounting, and it should also be noted that the interior of the abutment pieces and the undersurfaces of saddles are clean and free from particles of porcelain, which, after fusing, might interfere with the subsequent adjustment of the piece.

While it is desirable to use but one grade of "body" throughout the piece, for the reasons previously mentioned, a more artistic result is usually to be obtained by selecting a darker color for the first bake, and then finishing with a color which closely matches that of the facings, thus obtaining a blend of the two which results in a darker effect toward the base and down in the grooves and pits of the finished piece.

Baking. When the piece is thus ready for the first bake it should be adjusted to some form of fire-clay support which will cause it to sustain a perpendicular position and securely support it, and then placed in front of the slightly heated muffle where it should be allowed to remain until thoroughly dry.

In placing the piece in the furnace it must be observed that it is free from contact with the walls of the muffle, as too close proximity thereto frequently results in burning the color out of the facings, and direct contact would be likely to fracture them.

It should also be observed that the piece is placed *crosswise* in the muffle in order that a uniform heat may obtain throughout, as this varies appreciably in all open-end furnaces, and uniformity is imperative. And further it is usually best to allow the porcelain part of the piece to present toward the door of the muffle as by this means the fusing of the "body" may be observed during the process.

The muffle should then be closed and the temperature gradually increased until fusion begins, but for the first bake the body should only be fused to a high *"biscuit,"* or until a close coalescence of the particles has taken place. This will leave the surface somewhat granular, but insures a degree of shrinkage which is most favorable both to strength, and to the completion of the piece in two bakings.

When the baking is thus completed the heat should be *immediately* shut off, and the case then allowed to remain in the muffle until cool enough to remove therefrom without danger of checking the facings.

When sufficiently cool to admit of handling, the piece should then be removed and again adjusted to the pin-vise. Distilled water, applied with a small brush, should now be carefully worked down into all crevices and spaces presenting as a result of the shrinkage, as a means of assisting in carrying the body well down into places which might otherwise be difficult to completely fill.

Well mixed "body" of the proper color and consistency should now be applied with the point of the carving instrument and carefully worked down into all such spaces by jolting with the serrated edge, and when these are well filled the surplus moisture should be absorbed, and the full outline, contour and occlusion restored, when the piece is ready for the second bake.

If the first bake was carried to the point of shrinkage and vitrification indicated, and the body was closely packed, two bakes will usually be all that is required to complete the case, but the second bake should, of course, be carried to the point of complete vitrification, and be heated, and allowed to cool, in the same manner.

In cases where gum restoration demands the presence of pink enamel, that may be used at this time also provided its fusing point is approximately the same as that of the basal body, but if it should be of the low fusing variety and a higher fusing body used for the base, a third or separate baking will, of course, be necessary.

In the event of inperfections after the second bake, a third, or possibly even a fourth, bake may be required, and in such instances the lower fusing enamels can be used to advantage whenever the proper color may be obtained.

If the body has been each time closely packed, and at no time overfused, any grinding which may be demanded by the desired adjustment can be done with impunity, but such surfaces should afterward be highly polished with fine disks.

Finishing.

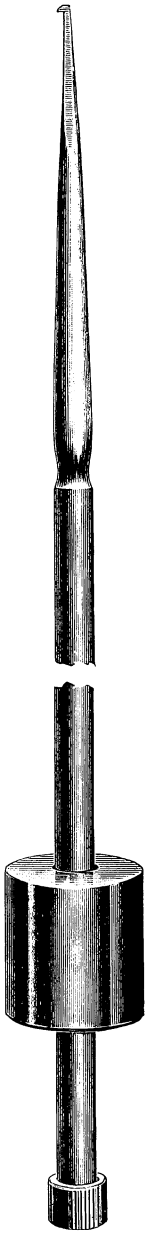


Fig. 359.

For the reason that so little metal is exposed, the finishing of porcelain bridgework is usually a very simple procedure, and yet even though beyond the range of vision all the surfaces of platinum which are not covered by porcelain should be well finished with stones and disks, and then highly polished on the lathe in the usual manner, in order that the work may possess every possible artistic and hygienic property.

A more *finished* appearance may be then obtained by gold-plating, and such a procedure is particularly indicated in cases where the platinum may be exposed to view, and also where both gold and porcelain work are combined in one piece.

Repairing.

The repair of porcelain bridgework is usually attended with many difficulties, the principal one being the removal of the piece when mounted with cement. As this becomes imperative, however, it must be effected irrespective of the mounting medium, and therefore when cement has been used, some further mutilation of the piece must be expected, and is usually unavoidable. To encounter these difficulties, however, will serve as an object lesson and show why porcelain bridges in general and dowel crowns in particular should never be mounted with cement alone. In the removal, if telescope crowns are present, their attachment to the roots should be destroyed first, and this can usually be accomplished in the most expedient manner by the method illustrated in Fig. 114. The detachment of dowel crowns is, of course, more difficult, but these may usually be loosened by protecting the porcelain with pads of cotton in the form of rolls, grasping the piece with heavy pliers or forceps, and then gradually working it until the attachment of each abutment piece is broken, or, a very ingenious and

most useful instrument adapted to this particular purpose, designed by Dr. C. G. Morrell of Chicago, and illustrated in Fig. 359, may be used by hooking the beak over the edge of the band, and then pounding against the other end with the cylindrical weight.

After removing, all remaining particles of cement, gutta-percha, etc., should first be cut away with burs and the case then placed in the acid bath. This should be followed by washing it thoroughly in tepid water in which has been dissolved a liberal quantity of sodium bicarbonate, after which it should be allowed to become thoroughly dry.

The remaining accumulations of organic products must then be removed before any effort to effect repair is attempted, and this may be accomplished by placing the piece in the furnace, before heating the muffle, and then turning on the heat *very slowly* at first, until, by gradually and carefully increasing it to a low red heat, all organic matter may be burned out.

As a means of preventing too rapid heating, and the possibility of fracturing the facings, or otherwise injuring the case, it may be entirely submerged in an investment, compounded largely of asbestos, previous to placing it in the furnace, and then subjected to the same degree of heat in the same manner. While a safe precaution, this is unnecessary however, in small pieces or single crowns.

After this procedure has been observed, repairs may then be effected in the ordinary manner and without subsequent danger.

A Few Thoughts Concerning the Teeth and their Osseous Base.

By Richard Summa, D.D.S., St. Louis, Mo.

Read before the American Society of Orthodontists, Chicago, 1905.

Orthodontia, perhaps more than any other department of dental science, attracts our attention to the relation existing between the teeth and their osseous base. The influence exerted by one of these upon the other is so intimately reciprocal, that many times it becomes practically impossible to discriminate between cause and effect. Any reference to the growth of an organ must begin with a consideration of the structural units or cells of which all bodies, both animal and plants, are composed. *"Omnis cellula e cellula."* Wilson credits the origin of this aphorism to Virchow's doctrine that every cell is the offspring of a pre-existing parent cell. This suggests that every organ owes its existence to a transmitted germ, and hence the frequently abused theme of inheritance.

Theories of Heredity.

The human mind since time immemorial has cherished the mysterious and apparently supernatural. A reason for this may be found in the comfort and self-satisfaction derived from laying all good things and more especially all things bad and indifferent, at the threshold of some occult being or force.

Heredity, it is true, is one of the problems of nature which the human mind may never be able to solve completely. This apprehension should not lessen our desire for truth, but on the contrary it should stimu-

late us to approach this question with the same unprejudiced consideration and logic which has tended to restrict so many mysteries of the past.

Great consolation has been derived from the dictum of the inheritance of the small jaws of one parent and the large teeth of the other. It has served its time faithfully as a convenient subterfuge whenever difficulties occurred in the correction of so-called irregularities of the teeth.

When speaking of inheritance, it is but reasonable that we should ever be mindful of the significance attached to this term by biologists.

Perhaps the oldest theory which has gained any prominence is the "Theory of Preformation," with which the name of Bonnet is so intimately connected. It considered the egg as containing a miniature of the parent body. Accordingly, every organ is preformed and further development is but an enlargement of that which already existed. This would offer a very simple explanation of inheritance.

In 1759 Frederick Caspar Wolff demonstrated that the egg does not contain a preformed body. He considered the egg as a homogeneous structure which under the influence of some special force passes through different developmental stages resulting in a heterogeneous organism. This is known as the theory of "Epigenesis."

Almost a century later Darwin offered his theory of "Pangenesis." "According to this hypothesis, every unit or cell of the body throws off gemmules or undeveloped atoms, which are transmitted to the offspring of both sexes and are multiplied by self-division. They may remain undeveloped during the early years of life or during successive generations and their development into units or cells like those from which they were derived depends on their affinity for union with other units or cells previously developed in the due order of growth."

Next in order might be considered Naegeli's "Idioplasm Theory," which assumed that inheritance is effected by the transmission not of a cell considered as a whole, but of a particular substance, the idioplasm, contained within a cell and forming the physical basis of inheritance. This idioplasm was conceived as an extremely complex substance consisting of elementary complexes of molecules known as *micellae*. (Wilson.)

It should be noted that none of these authors had located the vital units. Not until about 1874, following the investigations of Auerbach, Fol, Buetschli and a little later those of Oscar Hertwig, Strasburger, Van Beneden, Koelliker and Weismann concerning the mechanism of development and the part played by the cell in hereditary transmission, was the conclusion reached that the chromatin of the nucleus contains the physical basis of inheritance.

Hertwig arrived at the conclusion that the germ nucleus is equally derived from both sexes; the cytoplasm, that protoplasmic substance which surrounds the nucleus, is derived from the female sex only and most probably furnishes the nutrition for the developing organism.

The theory of Weismann, "The Modern Evolution Theory," assumes that the germ-plasm is composed of a large number of different vital units, each of which bears a definite relation to certain cells of which the developing organism is composed. A group of these vital units he terms biophore; a group of biophores, determinants, because they determine certain parts of the organism; a group of these ultra-microscopic determinants he named id. The component parts of an id are said to possess the power of attraction and repulsion (vital affinities) to which growth by means of indirect cell-division is attributed.

Instead of a division of the egg into predetermined cells, Hertwig in his theory of Biogenesis assumes that all such cells are carriers of all characters of the species. Their specialization is due to the various internal and external influences.

Professor Hugo DeVries, the Dutch botanist, formulated the theory known as "Intracellular Pangenesis." Concerning this Wilson writes:— "The neo-pangenesis of DeVries differs from Darwin's hypothesis in one very important respect. Darwin assumed that the gemmules arose in the body, being thrown off as germs by the individual tissue-cells, transported to the germ-cells, and there accumulated as in a reservoir; and he thus endeavored to explain the transmission of acquired characters. DeVries on the other hand, denies such a transport from cell to cell, maintaining that the pangens arise or pre-exist in the germ-cell, and those of the tissue-cells are derived from this source by cell-division."

Even a more thorough consideration of these theories of inheritance than the time allotted to my discourse would permit, can but suggest that within the germ cell, most probably within the nucleus, there exist vital units which are designed to produce specialized cells and these in turn are the units of the various organs of plants and animals. These vital units have been variously named: gemmules, micellae, biophores, idioblasts, pangens, etc.

The nucleo-plasm of the female germ cell and of the male germ cell are the carriers of the characters of the parents, therefore only that which is transmitted to the offspring through the germ-plasm can be regarded as inherited.

Prof. J. Orth writes: "The words inherited and congenital are often used synonymously, but there is no justification for it because although everything inherited is also congenital, it does not necessarily follow that

everything congenital is inherited. The opposite to inherited is acquired. Acquisitions are either extra-uterine or intra-uterine; if intra-uterine, they are congenital but not necessarily inherited."

Transmission of Acquired Characters.

We must now consider the much discussed question of the transmission of acquired characters. According to the hypotheses of inheritance which I have previously enumerated it appears that all biologists agree that every transmissible character is expressed in the germ-plasm. Therefore to transmit any acquired character it becomes essential that such acquired formation be promptly recorded in the germ-plasm. We know that not all conditions which justly come under this caption are transmitted to the offspring, and consequently a distinction between transmittable and non-transmittable acquired characters would be of great value. This, however, seems to offer the great difficulty.

The clearest distinction I have been able to find in my study and one that harmonizes with the various theories is among the writings of Orth: "Qualities which are derived from the continuity of the germ-plasma are inherited and hereditarily transmissible.

"What has arisen through primary variation of the germ-plasma and appeared for the first time in the offspring, is acquired indirectly and can also be transmitted hereditarily.

"That which produces a secondary but adequate variation in the germ-plasma after having appeared first in the soma (body) of the same generation is acquired and hereditarily transmissible.

"Acquired conditions of the soma which do not produce an adequate variation in the germ-plasma cannot possibly be transmitted. This seems to apply to all mutilations of external and superficial parts."

Weismann, especially, expresses a most serious doubt as to the possibility of the transmission of acquired characters because of the necessity of recording these characters in the germ-plasma. The same author ascribes the apparent transmission of acquired diseases rather to an infection of the germ-plasma than to any change within the germ-plasma.

Relation of Heredity to Tooth Forms.

While we have under consideration the transmission of characters of the teeth acquired by an animal during its life time I wish to submit the following argument of Tomes:—"But even if we grant the one much disputed point, namely, that characters acquired by the individual during its own life time can be transmitted to its offspring, there is a special difficulty remaining in the case of the teeth in adopting the simple mechanical explanation that the teeth are, so to speak,

drawn out of their forms, whether in one or in ten thousand generations. For, unlike the bone, which is constantly growing and being renewed after it has come into use, that portion of the tooth which is subject to these direct influences is hard and rigid, and its form, whatever it be, in that individual is unalterable; in order to alter the form of the masticating surface by direct mechanical means, it would seem that the influence must be brought to bear upon the teeth while they are yet soft, when they are still buried within the jaw in their bony crypts. And we can not safely assume that structures like enamel covered dentin can be altered by pressure, the essential character of dentin being its elasticity, and that of enamel its rigidity. It therefore follows that the tooth is of a nature very little likely to be deformed, or being deformed, to retain its deformity."

Before passing this subject I would like to call special attention to the plausible suggestion as to the difficulty of explaining the transmission of acquired characters of an organ so insusceptible to external influences as the fully developed tooth.

Transmission of Characters.

Qualities derived from the continuity of the germ-plasm establish that structure of an organ which has been selected through generations as best adapted to the performance of the function for which it is designed. These qualities establish the normality of an organ and it is but reasonable to assume that the reproduction of these qualities is the inherent tendency to transmission. *From this it follows that the inherited germ tends to reproduce an organ primarily indicative of the genus from which it comes and only secondarily bearing the stamp of its immediate ancestors.*

Applying the preceding principles to the organs which interest us more particularly, we must subscribe to the statement of Walkhoff that the final shape of the mandible results from the influence of the muscles of mastication and speech and the growth, use and loss of the teeth upon an inherited germ. To these must be added the influence of the difference in atmospheric pressure within and from without the oral cavity produced by the harmonious action of the muscles of the cheeks, lips and tongue.

For the sake of lucidness we might sum up the factors involved in the development and growth of the jaws as follows:—

1. "A transmitted germ possessed of an inherent tendency to reproduce an organ adapted to readily resume the function most frequently exercised by the ancestor."—Walkhoff.

2. Development, growth, eruption and function of the teeth.

3. Influence of the muscles of cheeks, lips and tongue by virtue of their tension and the difference in atmospheric pressure from within and from without the oral cavity produced by their activity.

We may say that the first factor I have mentioned is responsible for the existence of the organ; whereas the latter two, external agencies, are responsible for its development.

It is, indeed, difficult to decide as to the relative importance of factors each of which is designed to perform a duty so peculiar to itself that none can take the place of the other, while the influence of all are necessary to attain a certain result.

It seems to me but logical to assume that the germs transmitted for the jaws and teeth in any given case tend to reproduce jaws and teeth primarily indicative of the genus to which the parents belong, and only secondarily impress upon these organs the variations and transmissible acquired characters of the more immediate ancestors. Therefore we expect to find in man jaws and teeth peculiar to the "genus homo" and varying within certain limits according to racial and family characteristics.

That the jaws and teeth are located in a certain part of the face; that the teeth are composed of certain structures; that they occur in certain numbers and forms and in a certain approximal and occlusal contact no one will deny. And these are, at least, some of the qualities which establish the normality of these organs. The relatively slight variations which they present in size, color, form and in the different degrees of physiological prognathism of the arches are the stamps of race and family type.

The Teachings of Comparative Embryology.

While inquiring into the part played by the teeth in the development of the jaws, it is of interest to consider some of the teachings of comparative embryology and anatomy. Tomes writes: "If the growth of the dogfish be followed, those spines of the skin which cover the jaws become developed to a far greater size than those outside; a groove without spines appears between the jaw and lip, and the identity and continuity of the two become to some extent masked. No one can doubt, whether from the comparison of adult forms or from a study of the development of the parts, that the teeth of the shark correspond to the teeth of other fish, and these again to those of reptiles and mammals; it may be clearly demonstrated that the teeth of the shark are nothing more than highly developed spines of the skin, and therefore we infer that all teeth bear a similar relation to the skin. This is what is meant when teeth are called "dermal appendages," and are said to be perfectly distinct from the internal bony skeleton of the animal; the teeth of the shark (and of many other creatures) are not only developed, but always remain imbedded in tough mucous membrane, and never acquire

any connection with bone. Indeed all teeth alike are developed from a part of the mucous membrane, and any connection which they may ultimately get with the bone is a secondary matter."

I have often read this chapter by one of the best authorities. It would not be surprising if it formed the basis for the belief expressed so frequently that teeth and jaws of higher types of animals also develop and grow quite independently of one another. The expression that "teeth are highly developed spines of the skin" no doubt added to the confusion, many taking this to mean that the most important dental tissue, the enamel, is an epidermal structure derived from the epiblast. At least one author of a chapter on orthodontia explained the inheritance of the large teeth of one parent and the small jaws of the other by the naive assumption that in such cases the epiblastic structures are derived from one parent and the mesoblastic structures from the other.

I feel quite confident that such suggestions are misinterpretations. When speaking more definitely Tomes and Hertwig use the expression "dermal appendages" which implies that the most important dental tissues are derived from the derm or corium which originates, as does all connective tissue (including bone), from the mesoblast or, more particularly speaking, from the mesenchyme. Therefore bone and the most important dental tissues, the dentin and cementum, are embryogenetically related. Hertwig has made the interesting observation that in many amphibia the vomer and palate bones result from the confluence of small bony plates which have formed around the base of the teeth. Just a little careful observation must convince any one that the osseous base upon which teeth are carried is subservient to these. *To my mind the study of this question offers a strong suggestion that the tooth is the initiative for the existence of the calcified jaw.* According to Walkhoff the rapidly growing dental papilla, which is also responsible for the eruption of the tooth, compresses the fibers of the spongy bone surrounding the tooth-germ into compact bone. This observation gives us the first inkling of the effect of the growing tooth upon the adjacent osseous tissue.

Formation of the Jaws.

Of almost equal importance to the continued growth of the jaws are the muscles of the cheeks, lips and tongue. The mandible, especially, is influenced by the muscles inserted in it. The pressure and tension which they exercise varies according to the occlusion of the teeth. Thus one possessing a full complement of teeth in normal occlusion would instinctively employ these muscles to produce different excursions of the mandible during the act of mastication than one who has an impaired occlusion. Dr. Walkhoff* who has made a very thorough study of this ques-

* Walkhoff.—Der menschliche Unterkiefer im Lichte der Entwickelungsmechanik. Id.—Der Unterkiefer der Anthropomorphen und des Menschen.

tion, employed the X-ray to ascertain the arrangement of the inner structure of the mandible of man and the anthropoid apes. He found that the originally irregularly deposited spongy structure of the ramus becomes arranged into a system of fibers called a trajectory already during embryonic life. At birth there exists such a trajectory which extends in a straight line from the condyle to the symphisis. Soon thereafter this straight trajectory becomes bent immediately behind the alveolar process. This is caused by the growth of the teeth and the development of the alveolar process and becomes more marked as new teeth assume their function. A little later new trajectories are formed in consequence of and corresponding to the function of the muscles of mastication and of speech. It is impossible to report the results of his investigation in detail, suffice it to state at this time, that Walkhoff demonstrates conclusively the powerful and everpresent influence of muscular tension and pressure upon the inner as well as superficial structure of the mandible.

We must bear in mind that the mandible is held in a state of equilibrium by the muscles inserted in it; that by a contraction of certain groups of these muscles the various movements are produced and that when the mouth is closed the mandible is held at rest by suction which is nothing but a difference in atmospheric pressure* from within and without the oral cavity.

The pressure of the tongue is a factor of equal importance in the development of either dental arch.

Muscular tension and pressure upon the superior maxillae is not as great as in case of the mandible because the muscles inserted in it serve functions less apt to influence bone formation. Although the pressure and tension of the muscles of the cheeks and lips (muscles of expression) is a factor not to be minimized, yet I believe that in the moulding of the upper arch atmospheric pressure is of greater importance.

Study of Crowded Arches.

It has also been urged that the frequent occurrence of crowded teeth among civilized races indicates nature's plan of a further reduction of the size of the jaws. This brings us to a consideration of the creation of species and varieties by the adaptation of organs or parts of organs to new environments. This is another problem which has aroused animated controversies among biologists. Perhaps the majority are of the opinion that varieties and species are produced gradually by selec-

* The Influence of Atmospheric Pressure in Molding the Dental Arches.—Dr. F. Zeliska.—Proceedings of the Fourth Int. Dental Cong.

tion of those qualities which serve the present conditions best; others under the leadership of DeVries do not believe that new species are the result of gradually increased "individual variations." According to their belief new species are the result of sudden changes which they call *"mutations"* in contradistinction to "variations" which, being brought about gradually, are fluctuating and do not produce new species.

Granting, for sake of argument, that nature plans in thus reducing the size of the jaws and that mutations are not simply inexplicable happenings, the mode of reduction suggested by the crowding of teeth prompts a few questions.

First, does the reduction of the size of the jaws precede the reduction of the teeth?

Second, if teeth are to be eliminated in consequence of a previous reduction of the size of the jaws, are they eliminated by being crowded out of alignment?

Third, if some teeth must be eliminated is that to be accomplished so unsystematically that different teeth are crowded out of alignment in different cases as though nature were constantly experimenting to find the easiest object of attack?

We assume that the ancestors of civilized man of the present day were of the prognathous type, such as we still meet in the lower human races. It is customary and plausible to attribute this prognathism to the prehension of food, a function no longer exercised by civilized man.

The reduction of this physiological prognathism to the present orthognathism was not accomplished by crowding teeth out of alignment promiscuously. It is possible that teeth were reduced in size, but the most striking change we are able to observe, has been the receding of the dental arch upon the body of the jaw. This condition has been pointed out by several authors and especially by Dr. Cryer. While the occlusal relations of the dental arches are identical in both the prognathous and orthognathous types, in the former the third molars are anterior to the ramus while in the latter the third molars are partially obscured by the ramus. This backward movement of the dental arches is doubtless the cause of the dwarfing of the third molar. Thus the gradual dwarfing of an organ prior to its total elimination from the animal body is again substantiated.

It is generally accepted that use of an organ increases and disuse diminishes its power of assimilation. This principle holds good in every struggle for existence. The survival of the fittest takes place whenever and wherever conflicting interests exist between different genera, species, varieties, individuals, different organs of the same individual, different tissues of an organ, different cells of a tissue and if we accept the germ-

plasm as consisting of a system of vital units it is but logical to assume that the same struggle goes on there.

Weismann expresses the opinion that degeneration, which all organs undergo prior to their elimination, begins in the final stages of an organ and is only gradually reflected in the embryogenic stages.

As has been previously stated, only those characters which have produced an adequate change in the germ-plasm after having first appeared in the soma (body) are hereditarily transmissible. In other words, in order to pronounce any peculiarity of teeth an inherited acquired character, such a character must at first have appeared in the teeth of the parent (most probably as the result of environment); and secondarily it must have produced an adequate change in the germ-plasm of this parent.

In view of the comparative insusceptibility of fully developed teeth to external influences changes in their forms during the life time of an individual can be but slight and of such nature as to preclude a corresponding change in the germ-plasm.

However, it is otherwise in regard to changes of the positions of teeth individually and more especially in regard to the form and position of the dental arches in their relation to the bodies of the jaws. The osseous base of the teeth is very susceptible to the influence of external agencies, undergoing constant and comparatively rapid alteration, and some of these changes are hereditarily transmissible.

I am inclined to conclude that the conceded prospective elimination of the third molar from the orthognathous types of man is to be explained by the compression of its late appearing germ.

In concluding permit me once more to use the words of Tomes:—"He would indeed be a rash man who ventured to assert that he had recognized all the agencies which are at work in the modelling of animal and vegetable forms; but it is safe to say that, at the present time, we are acquainted with 'natural selection,' or 'survival of the fittest,' an agency by which variations beneficial to their possessors will be preserved and intensified by successive generations; of 'sexual selection,' which operates principally by enabling those possessed of certain characters to propagate their race, while others less favored do not get the opportunity of so doing; and of 'concomitant variation' between different parts of the body, an agency much more recondite in its operations, but by which agencies affecting one part may secondarily bring about alteration in some other part."

Let us hope that the clinical observations of the orthodontist of the "New School" will assist in elucidating some of these questions.

Discussion.

Dr. F. B. Noyes, Chicago, Ill.

This paper is valuable in that it presents certain suggestive thoughts which can be taken to the laboratory and to the chair and verified by observation. A theory of hypothesis is valuable to any science in proportion as it suggests possibilities of verification. One which cannot be verified is of very little value, as it leaves us no farther along than we were before.

As you know, the question of hereditary influence as an etiological factor in malocclusion has been written upon very widely for a great many years. There are people who are willing to ascribe the whole etiology of malocclusion to degeneracy, and degeneracy is an expression of heredity. The expression is not the fault of the individual, nor of his environment or function, but the fault of the material that was given to him by his antecedents, in the makeup of his body.

If we ascribe everything to degeneracy we eliminate all possibility of any influence of the teeth on the jaws, or the jaws on the teeth in development, or any modification of development by normal or abnormal function. Therefore we must admit that it is not the only factor. Now I do not minimize degeneracy as an etiological factor, but I want to consider the possibilities of hereditary influences in the light of scientific knowledge at the present time, and as it has been presented in the paper, and in my judgment this has been remarkably well worked out.

I want to take up the first statement in the paper: "Orthodontia more than any other department of science attracts our attention to the relationship existing between the teeth and their osseous bases."

Evolution.

In the study of comparative anatomy one cannot help but be impressed with the fact that the teeth are developed, first, and the alveolar process is developed afterwards; that the tooth was, in its origin, a dermal appendage, and that these little hardnesses of the skin which happened to cover that portion of the animal which was used in obtaining food became developed to assist in obtaining and masticating the food. We find in the dermal scale exactly the type of tooth; the same tissues, a cone of dentin covered with a cap of enamel, bearing the same type of tissue and showing the same structure as these tissues present in the fully developed tooth. The connective tissue forms a ring of cementum around the base of the denticle which attaches the fibres of the connective tissue to it exactly as the cementum of the human tooth attaches the fibres of the peridental membrane to the tooth. In some cases, for instance the sturgeon, we find these individual spines becoming united by these bases, by continuous calcification, uniting one spine with another,

and so forming the armor plates of the sturgeon and the gar-fish. There is in the dermal scale no relation to the bone whatever. The hard spicule is held in the corium in the dermal layer of the skin by a form of calcified connective tissue which attaches the connective tissue fibres to the denticle.

But you can readily see that when those spines came to be used for mastication and prehension of food this was not sufficient, and the scales were pulled off and removed, and had to be replaced, as the scales through the process of natural selection became larger and larger in the origin of the jaw, the support which they required became greater and greater, until we had the formation of an additional support. This development has gone on in two lines, one adapted to one class of animals and another adapted to another class of animals. In one line of evolution the teeth become attached to the bone by the growth of the bone up to them, and the attachment of fibres of the connective tissue building them into the cementum of the tooth on one end and the surface of the bone on the other. That still being insufficient, the bone began to grow up around the tooth, and the portion of tooth to which the fibres were attached became longer and longer, forming the root, the bone growing up around it, so that we get a mutual relationship between the tooth, the connective tissue fibres and the bone, leading gradually to the development of a special portion of bone added to the original jaw, forming the alveolar process, which was put there for the purpose of fastening the tooth in its position.

In the other type of evolution, such as we have in fishes, instead of having that kind of relationship existing, we have in the conical pulp chamber, the formation of spicules of bone, and these spicules of bone gradually interdigiting and interlocking with spicules and dentin until you have the type of ankylosed teeth characteristic of fishes, which are absolutely immovable, and are attached to the bone, not by a direct continuity, I take it, but by an interlocking of bone formed in the pulp and dentin formed in the pulp, the pulp being tissue related to the tissue forming bone, and you have the interlocking of those calcified products attaching the tooth in that way.

So we see there are two courses which evolution followed in the relation of the teeth to the jaws. One the interlocking of bone and dentin through the activity of the pulp; the other the attachment of the outside surface of the tooth to the supporting bone, by a fibrous membrane. We are practically interested only in the form which developed the fibrous attachment of the tooth to the bone, and from the study of the way in which that has occurred, and from the study of the development and eruption of the teeth in man we cannot but be impressed with the fact, that the bone of the alveolar process deserves the name which has been used for it occasionally, in connection with the lower animals—the bone of attachment.

Heredity.

If even one tooth is lost out of the arch, you have the loss of that portion of the bone which was developed for its support. Now having established the relationship between the teeth and bone, and granting that in the process of evolution the bone has been developed with the teeth, for the sake of their support, to what extent is it possible that one reacts upon the other in a hereditary way?

In order to get a conception of the action of heredity one needs to analyze a little between theories and facts. Heredity is a difficult question to discuss at the present time, and an especially difficult subject to study from the standpoint of life, because the facts and theories become so mixed. About twenty-five years ago there was some very remarkable work done upon the structure of living things, some very remarkable discoveries made in the structure of the cell, and the mechanism, if I may so call it, of life. From those discoveries a very wide range of deductions was opened, and a number of active minds, intense mentalities, took up these facts as suggested explanations of a great many different things which never had an explanation before. From those facts which were comparatively few they have elaborated immensely complicated theories of heredity and transmission, and I want to say again that those theories are of use to biological science just in proportion as they are capable of being demonstrated in the biological laboratory. As far as they cannot be tested in the biological laboratory they do not advance our real knowledge. Let us go back for a minute, to these discoveries which started off the whole line of wonderful theories. What were they? Of course, the cell theory had been established. The structure of plants and animals had been worked out on a basis of cells. It was known that the animal body and the plant body were made up of individual units of life, and their products. It was known that each one of these units contained protoplasm and a nucleus, and that they were all derived from a pre-existing similar unit, by its division.

Influence of the Nucleus.

Now, a student in the laboratory working upon a single celled animal puts that animal in a bottle with pieces of broken glass, and shakes it up, chopping its body all to pieces, so that the single cell is cut into a number of pieces. He watches the pieces, and finds that the pieces of that cell which contain the nucleus or a portion of it continue to live, and to move, and begin to build up new protoplasm, and gradually reproduce a perfect cell; and that this perfect cell then divides and produces another perfect cell, while the pieces of the cell which contain none of the nucleus continue to move around in the water, and to manifest the phenomena of life for a longer or shorter time, but finally die. That is not

a theory. That is an observed fact. As a result of that work under the miscroscope, the statement can be made then that the nucleus exerts in some way (we do not know how), a controlling and directing influence over the protoplasm; that with the nucleus present the protoplasm will continue its building-up changes. Without this nucleus the protoplasm can produce only the tearing-down changes. You have there a relationship established between protoplasm and nucleus.

Then in observing the cell division it was found that the nucleus contained two parts, and one of those parts split up into a certain number of pieces, and that those parts equally divided, and were not only equally divided, but were systematically distributed in the diversion of nucleus, certain parts going to each cell. Then it was found that in the sexual reproduction the nuclear material was equally divided from the two parents, and in the first division of the ovum the characteristic amount and number of chromosomes reappeared. It becomes apparent from these observed facts that that chromatin, which appears in the first division of the nucleus of the fertilized ovum, is to be systematically distributed in every cell division which leads to the development of the new individual, and that that chromatin which is sent off into the various cells of the body is to control the activity of the cells. It is to control the development of those cells, so that at the proper time we have the enamel organ coming from the epithelium cells of the mucous membrane of the mouth, and we have the dental papillae coming from the mesoblastic cells of the jaw arch. The chromatin which is to supervise the formation of enamel has been sent into the enamel organ, and the mechanism is so perfect that when one begins to form enamel cells the other begins to form dentin cells and the two work together.

Heredity.

Now, what is possible? Is it possible that the chromatin which is to form one portion of the body should be derived from one parent and that which is to form another, from the other parent? We do not know that and until we do it is a waste of gray matter to spend very much time talking about it. To what extent is that development dependent upon other conditions? To what extent may development be inhibited or may it be increased by conditions of environment of the individual? That it is affected by the conditions of the environment of the individual is certain, for the one characteristic of life, is as Brooks has said, "adaptation, the ability to adapt itself to environment, and the changes of environment." Given a change of environment, in order to have a change appear in the individual which is being developed that would be transmitted to its offspring, it must produce not only a change in the tissue which is simply a reaction upon the cell tissue, adapting them to the environment, but that reaction upon

the cells of the tissue must have its effect upon the reproduction cells, the germ cells of the individual. In other words, the tissue must produce an adequate change in the germ plasm, as the essayist expresses it. How this can be done we do not know at the present time.

Inter-relation of Cells.

That leads us exactly to the problem which is at the present time most actively attracting the interest of biologists. Namely, "What is the relation between one cell and another of the body?" What is the possibility of one tissue or one organ affecting the other? The cells of the body are not absolutely independent of each other. The body is a unit and the individual cells of the tissues possessing a certain degree of individuality, a capacity for individual growth and activity, are related to each other to form a whole. They are parts of the whole. It is impossible to consider a body strictly as a colony of absolutely independent, individual cells, but as to any mechanism existing there, through which one cell influences another, we are at the present time in the dark, though there have been some very suggestive discoveries in the last five years. However, I think that as many problems have been in the dark for a long time, and then had a flash of lightning to illumine them, we may get a flash that will give some explanation of that interrelationship some time in the future. But we must remember that in order to have a condition which has been produced in this individual transmitted to its offspring, there must be a change in the chromatin in the germ cell which is to govern the development of the individual.

Alteration of Types and Number of Teeth.

If we have then established, following the line of the essayist, that there is the transmission of a germ or type of tooth, and that that type is capable of being influenced by its conditions, by its environments, and if we are aware, as we are obliged to know that in the reduced vigor with which the jaws are used we would expect a reduction in their size, the suggestion of the essayist in regard to the points at which this reduction in size affects the tooth, and the explanation for the points of attack is worthy of comment in my judgment. The third molar has been growing smaller, and is possibly being eliminated in the course of evolution. Why? Because its tooth germ is developed so late in the development of the individual that the bone which surrounds it is becoming harder and denser and has not been growing larger because of the absence of outside influences which would tend to make it grow larger. And that lack of room for the development of the tooth germ has its expression in the gradual reduction in the size of the third molar. In man, then, the third molar is the smallest, while in many of the other animals the third molar is the largest tooth.

Where is there any point at which the conditions and environment would have an opportunity of affecting the lateral incisors in their period of susceptibility, that is, in its period of formation? The essayist suggests the possibility of the union of the inter-maxillary and the maxillary bones, that union occurring early, or because of crowding and because of lack of environment, which causes a growth of the inter-maxillary bone, the lateral happens to alight at a point where it can be compressed by a failure of the normal development, and the tooth germ has been the natural one to show the effect of environment upon the development of the developing germ.

The work of Dr. Walkhoff, which was very nicely presented in the essay, is an exceedingly interesting one in this connection. It is interesting because it suggests something which in my judgment is capable of laboratory tests. In his pictures he shows that the skeleton, the frame work, the bony spicules of the jaw, are arranged in reference to the forces which come up from the surfaces of the bone which they support. Supporting the outside of the jaw we have the spicules running through the connective tissue, forming the cancelous bone which supports the outside shell, or layer of subperiosteal bone. In his X-ray pictures he shows that those plates come in lines which are related to the stress which is put upon the surface of the bone. Notice that this must be the result of, or an expression of stress put upon the cells of the tissues, causing them to arrange themselves in certain ways, and to build the bone plates in re-action and adaptation to the forces put upon them. Again an adaptation of life environment. Now, if that be true, and it seems to me very nicely shown, the result of stress which occurs upon the surface of the bone has its record in the depth of the tissues, not merely upon the surface of the bone directly affected. Is it not a suggestive thought that if we put an unusual mechanical stress upon the surface of the bone, or upon the tooth and the walls of its alveolus, we will set up a condition of internal stress in the bone which will produce a reaction on the part of the cells of the tissue, and we will have a modification of those spicules, the absorption and rebuilding of bone plates, readjusted to the stress? The suggestion to me then would be that the primary change resulting from force brought upon the teeth, and expressed in their alveoli, would be manifested, not so much in the wall of the alveolus, as in the spongy material surrounding the alveolus, and in a sense the alveolus would be moved through the spongy material.

Then there is another very important factor. After the movement has been completed is it not logical to suppose that if those teeth are held under a condition of stress not natural, and not capable of being brought upon those teeth in their normal and average functions, and the bone is

rebuilt in the condition, when the forces which produced that condition of stress are removed, and not having the teeth and tissues adjusted to the natural forces, that there will again be movement adjusting them to natural forces or to the forces which are habitually brought upon them normal or abnormal. Is it not necessary that in these movements the retainer should simply keep the teeth in the condition in which they receive, in a normal way, the forces which will habitually be brought upon them afterwards and thus produce a condition of structure in the bone which will hold the teeth in position? Your retainer, as I said before, is a reconstructed jaw-bone. Your *permanent* retainer is built of bone spicules and not of brass wire.

Dr. R. Ottolengui, New York.

Dr. Noyes made a suggestion as to why the third molar is smaller in man, and subsequently he explained to us what we call compressed laterals. Here is a clinical fact that I have observed: If a tooth is missing from the arch, and we seek it with an X-ray we usually find it present. The X-ray tells us its position. The lateral incisor, however, is frequently absent, and it is the only tooth, so far as my experience teaches, and I have been looking for them since the X-ray was introduced, that is ever found absent from the jaw, and I would like Dr. Noyes to advance some theory in explanation of that.

Dr. Noyes.

I cannot do it. That is about all I can say. It is true that the superior lateral is more commonly entirely absent than any other, but I think it is not quite true that it is the only one that is ever entirely absent. I have a case that came to me about two years ago, of which I have models and X-rays. The man was twenty-two years old, his only permanent teeth in the upper arch were the two central incisors, and the first and second molars. He still had temporary laterals and temporary cuspids, and one temporary molar on each side. The X-ray absolutely failed to show any trace whatever of a lateral, cuspid, or bicuspid, and it was interesting in that case because the mother and grandmother were deficient in two or more teeth. Some of these things I think will have to be explained as freaks. A part of the developmental material had gone in exactly the same sense as we find it partly missing in the spina bifida. We may suppose that the material for the development of certain tooth germs got side-tracked, and never did develope. I do not see any other explanation.

In regard to the peg laterals there is another factor. We have the factor of germ plasm handed down in a continuous line of heredity, and then possibly we may have cropping out in a later stage of evolution the type of a very early stage, a true degeneracy, the recurrence in the individual of a portion of chromatin which should have been lost way back in our great-great parents, in an evolutionary sense.

Dr. Milton T. Watson, Detroit, Mich.

I want to express my deep appreciation to Dr. Summa and Dr. Noyes, and I want to substantiate the statement of Dr. Noyes that teeth other than the lateral incisors are at times absent. I have skiagraphs of a case where bicuspids are missing, and the history of the case is sufficiently accurate to satisfy any one, for the deciduous teeth are still in place. I have other cases where bicuspids are missing, and the history has satisfied me that no extractions have ever taken place.

Dr. William J. Brady, Iowa City, Iowa.

I wish to add my word of appreciation for the excellent paper that has been presented to us, and I am glad to see that there is a tendency to investigate in this direction. When this society was organized its founders felt that there were certain things we needed to discuss which the ordinary dentist did not reach, and possibly did not comprehend. Among the various responsibilities which came to us is settling the matter of the effect of heredity upon malocclusion, and I am particularly delighted to find the trend of thought in this direction. We may take some credit to ourselves that at last really scientific study has begun regarding this very important matter.

Etiology of Tooth Degeneracy.

The discussion has drifted into the question of the formation of a peg-shaped lateral. There is a general law through which nature operates in regard to this matter which is found not only in man but in every animal that possesses teeth. All the teeth are built up from extremely simple sources—by an aggregation of primitive cones—and when there is no longer use for those teeth Nature disposes of them in exactly the reverse order in which she built them up. There is first aberration of form, then a reduction in size, then reversion to the primitive type from which it was built, and finally entire suppression of the tooth.

The teeth that are suffering most from the effects of disuse in man are first, the upper third molars, next the upper laterals, then the upper second bicuspids, and last the lower third molars. The upper teeth have been affected much more than the lower; the third molar has passed almost entirely through the first stage—aberrance of form—has long been in the second stage and is well on in the stages of return to the primitive cone and final suppression. The lateral incisor is a close follower, and if the present method of life keeps up both these teeth will be suppressed in time. The peg-laterals occasionally found now are examples of the workings of this law. The upper second bicuspid has reached only the second stage as yet, and occasionally examples are found of the first stage. I have several models showing great aberration of form in this tooth.

The lower third molar is largely in the first stage as yet, and it is well

known how aberrant in form this tooth is, being liable to be found in almost any condition in regard to its crown, though the roots—which naturally degenerate first—have passed into the later stage. It will be noted there are three teeth in the upper jaw that are well on the road to suppression against one in the lower. This difference might be reasonably explained, it seems to me, in this way: The lower jaw is the movable one, and has the benefit of exercise, as it is continually moving—in most people. The lower jaw is the active agent in mastication, while the upper is the passive, and this difference accounts for the more rapid degeneration of the upper teeth and jaws.

I am glad to see a tendency to discuss these matters, as they must be settled before we can advance orthodontia as it should be in the teaching of the future students of the subject. The present ideas concerning heredity have seemed wrong to some of us for some time, which belief has been strengthened with all further study performed, till now we are sure in our own minds that the old teaching is not true. Others are not so sure, however, and any error that has long been accepted as the truth requires a mighty effort to overthrow. We must not only satisfy ourselves that heredity does not operate as has been taught, but we must show the facts; prove it in all ways, over and over, and still again, and finally drive error from the field it occupies by an overwhelming and long continued onset of the truth.

Dr. R. Ottolengui, New York.

I was too positive in the statement that no other teeth but laterals are missing. What I really meant was that no other teeth seemed to be habitually missing. The superior lateral incisors are frequently absent and even among my own acquaintances I know of several.

I will not dispute the case that Dr. Noyes refers to, but I wish to make a comment on the value of evidence, because there are sometimes very startling statements that are naturally open to suspicion. Dr. Watson said he felt certain in one case, that there had been no extraction because the temporary teeth were still in place, and the X-ray showed no evidence of teeth below. A picture has been handed me of such a case. There are two temporary molars, with no picture of bicuspids under them. There is a very distinct appearance of the absorption of the roots of the superincumbent teeth giving you the appearance of teeth, while there is no shadow of a tooth. I have seen teeth erupt uncalcified. In one instance it was simply a tooth germ. Now you may question my diagnosis and believe that it may have been some other soft tissue, and not a tooth germ, because I did not prove it by a microscopic examination.

Here is another instance: I once had brought to me an infant with a loose temporary central incisor that had just erupted, and in the effort

to find out what was the matter with it, I was feeling it with my fingers. The complete enamel shell came off, and the dentinal germ was entirely uncalcified. That, of course, is an exceedingly rare case.

I want to make a suggestion as to the prevalence of the absence of laterals. It is an argument that is interesting, but we have not proved it. May there not be some connection between the absence of these teeth and the inter-maxillary suture at that point? We have two inter-maxillary bones, and finally the complete bones are united. What do we see in cleft palates? We often find the entire absence of one of those bones, and it is a common thing to find a lateral incisor absent, but the central incisor persisting and coming out on the opposite side of the medium line, so that you have two central incisors on one side of the suture, with one lateral incisor absent. You very often find right in the cleft both the cuspid and central incisor but the lateral is nearly always absent.

Dr. Edward H. Angle, St. Louis, Mo.

Mr. President, if we had plenty of time I would like to talk in confirmation of some of the points that were made by the essayist on this subject of heredity which is of such vital importance to us as orthodontists, but there is not time. It is, however, my duty as well as my pleasure to express my high appreciation of this paper. I do not believe that this society has thus far listened to a paper that has been given more conscientious study and hard work, but it is in direct keeping with the character of all the work Dr. Summa has done for this society,—painstaking, untiring drudgery. Whatever he does in the line of society work—and I have been associated with him in the work of other societies—is always faithfully, honestly and ably performed. So it is with real pride I commend this paper on this interesting subject,—one of a class of subjects which we must study broadly and intelligently if we would ever make much progress as specialists.

Now just a word in regard to my friend Dr. Noyes, who has discussed this paper so ably. Inasmuch as he is in reality more of an orthodontist than a dentist, for the character of his work must naturally be and is more appreciated by orthodontists than by dentists, and in view of the fact that he has been so loyal to this society, giving to us freely from his storehouse of valuable knowledge, I wish to propose his name for membership in our society. He will be eligible under our rules, I think, because he is a teacher in the school of orthodontia.

Dr. N. S. Hoff, Ann Arbor, Mich.

In regard to the incident which Dr. Ottolengui has brought up, that missing teeth are not always revealed by the skiagraph, I think that we ought to be a little careful. In my experience I have found that the skiagraph does not always tell the whole truth. I recently had three skiagraphs made of an impacted third lower molar. The other adjacent

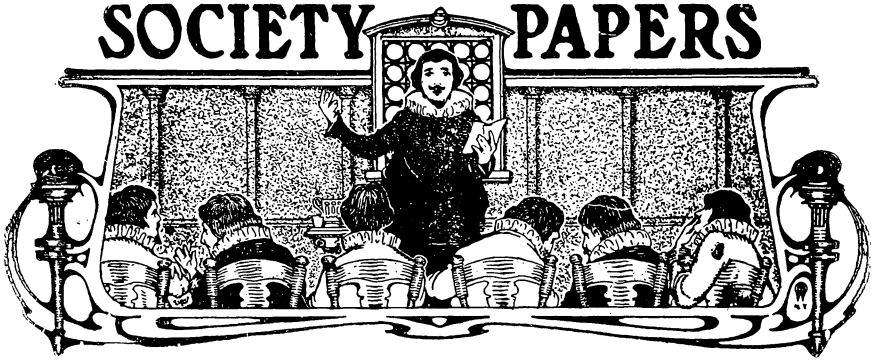
teeth were clearly outlined, but no indication of the molar wanted was present. I knew it was there because I could feel it, and I afterwards extracted it. I think, therefore, that we should be very careful, and not depend always on the skiagraph in regard to these matters.

The paper which Dr. Summa read was one of the best that I have listened to in a long time, and I know that it will be productive of good results. The fact was beautifully brought out showing muscular attachment and its influence upon the jaws themselves in developing the bone tissues to their proper and normal condition. It seems to me that here is where we shall find an explanation for the numerous deformities which might have been prevented. I realize also that we may have accidental positions which we cannot control. It is only because we have abnormal functions that we get these abnormal results, and it would seem that we should not lose sight of the fact that we have a duty to perform from the biological or developmental standpoint as well as from the mechanical and corrective standpoint.

There is another point, and that is the influence of mechanical efforts to correct malocclusions of the teeth upon the alveolar structure which supports the teeth, especially of the mechanical appliances used. The work which we do should leave the jaws as nearly normal as is practicable, especially where we undertake to correct the mal-positions of the teeth in the developing jaws. We should carefully design the construction of the appliance and carefully control the manner of using it, so that we may not exert at any time abnormal pressure which may tend to produce pathologic results rather than physiologic results.

Dr. W. O. Talbot, New Orleans, La.

I would like to relate a case bearing on hereditary influences that cause the non-eruption of teeth. I have in my practice a family in which there are seven children. I believe four are brunettes and three blondes. The brunettes resemble their father who did not have all of his teeth. In each of the brunettes most of the permanent teeth are missing. Each of them has the upper central incisors, and the first permanent molars. Some of them have the lower incisors, others only the lower first bicuspids. Each of the blondes has a well-developed set of teeth, which was also the case with the mother, who was a blonde. Just what influence heredity has had in these cases I have been unable to determine, but I was unable to find any acquired cause of any environment that would have affected the development of these teeth in the brunettes. One peculiarity about the family is that in the lower jaw, what we usually term the alveolar process, has developed between the permanent teeth, and after the temporary teeth are removed the ridge stands in good line. After the permanent and temporary teeth have been removed the ridge is well formed, and carries an artificial denture well.



A Plea for a Uniform Method of Treating Alveolar Abscess.

G. Lenox Curtis, M.D., New York.

Read before the Central Dental Association of Northern New Jersey, April 16, 1906.

The crude methods of our predecessors, the earlier dentists, have been gradually improved upon, until they have crystallized into a system of approved methods, of which we their successors may well be proud. And this process of improvement and development in our profession, is still going on. But there is one very important subject that is quite frequently presented in the practice of every dentist, that seems to have been neglected, and that is still surrounded by a great diversity of opinion as to the best method that should be employed in its treatment. I refer to the disease, alveolar abscess. The present status is lamentable, and it is one that in my opinion, demands the most serious and immediate consideration and correction.

Every dentist seems to have a method of his own for the treatment of alveolar abscess, which is often radically different from that of his fellows. The great diversity of opinion that exists in relation to the proper treatment to be applied to produce a favorable result in this disease is quite remarkable. But it is not at all remarkable that the result from the use of many of the methods suggested should be nothing but failure. Few practitioners have had the opportunity that I have had, to become acquainted with the details of many of the methods employed by both dentists and doctors in the treatment of this disease, for a large number

of both, from all parts of the country, have when their own methods failed, sent the cases to me for treatment.

And in the examination of these cases so sent to me, I have acquired a knowledge of the methods employed by the practitioners who first attempted to treat them.

If the science of dentistry is properly taught in the regularly organized and chartered colleges that are now in operation in the United States, how does it happen that in the case of the alveolar abscess, a disease that must be presented often in the practice of every dentist, there should be such a diversity of opinion among the graduates of these colleges, as to the proper method to be employed in its treatment? How does it happen in all these years of progress, that the proper method has not been found, promulgated and properly taught by the professors of operative dentistry, in the different colleges?

This deplorable lack of uniformity is largely, if not altogether due to the fact, that each professor of operative dentistry teaches the method which he practices, and as I understand, without any regard to the methods stated in the text-books used in his college which may be radically different. The inevitable result is that the ideas of the students become confused upon this subject, and they do not know what method to employ. In such a dilemma they will be most likely to adopt the one presented by the professor, whether it be a good or a bad one. It is true that no matter how simple any method may be, not every one can become expert in the practice of it. Thoroughness and exactness in practically carrying out the details of a method, are largely inherited qualities of mind, which are hard to acquire.

The difficulty that would attend any effort to introduce and establish a new or approved method of procedure, no matter how deserving it may be, will be in inducing the majority of practitioners to adopt it, even when they are dissatisfied with the methods they have habitually employed.

The following plan of introducing and promulgating a uniform method of treating the malady in question, would I believe overcome this difficulty.

Suggestions for Establishing a Uniform Practice.

Let the National Dental Association offer a prize for papers setting forth the best method of treating alveolar abscess, in all its stages; the merits of these papers to be decided by three judges, selected one each, from New York, Chicago, and Philadelphia, the three principal centres of dental education.

The selection of these judges would be a very important matter; it should be free from politics. They should be well known, unprejudiced

and skilful practitioners, but should not be connected with any dental college. The Association of Dental College Faculties should upon the request of the National Association agree to recommend the method adopted by the judges selected by the National Dental Association, and see to it, that all colleges teach it, for at least a period of years, or until a better method is developed and adopted under similar conditions.

It should be incumbent upon the National Dental Association to give the method receiving the prize as much publicity as possible. It should be illustrated, and published in all dental and medical periodicals, and copies should be mailed to all dentists, and practitioners thoroughly instructed in this method, should be sent by the National Association of Dental College Faculties from college to college, to impart it in all its details, to the professors of operative dentistry. And it should be the duty of the *practitioner* so sent, to be present, when the professor of operative dentistry teaches the method to the student; so that he may be sure that he understands the matter, and can and does teach it correctly, so that the students taught by him can diagnose and treat this disease by the approved method.

Having called your attention to what I consider a much needed reform, I will now proceed to state some of the conditions which may accompany its development. It would occupy too much time if I were to endeavor to describe in detail, the different methods employed in the many complications that may accompany the development of this disease; therefore, I will give a general outline of my method of treating it when presented in some of its forms.

Cause of Alveolar Abscess.

The cause of alveolar abscess is not the tooth, but the decomposed pulp within it.

There is no more necessity for extracting a tooth to correct a disease at its root (unless the whole of the alveolar process surrounding the tooth is in a badly diseased condition), than there is to tear down a house to correct a defect in the sewer pipe. When the pulp of a tooth has become putrescent, there is sure to be an abscess at its roots, no matter what may be the condition of the gum. This can be easily proven by passing a small drill through the gum and alveolus to the apex of the roots, where it will enter the cavity formed by the absorption of the alveolus. If the tooth is painful, this will give immediate relief, by discharging the contents of the abscess.

The best description of the cause of an alveolar abscess I have found, is that given by Dr. Farrar, and is as follows:—"The gases arising from the putrescent pulp are forced through the apical foramen where the pressure distends the peridental membrane, which thus becomes the walls of the abscess."

The distension may be so gradual as to induce absorption of the alveolar process without any great disturbance; possibly with no more than a mere tenderness. The gum may not be more than slightly congested, even if at all. Necrosis may or may not be present. There is always, however, an absorption of the alveolar process. Sometimes it is so extensive as to lead one to mistake the cavity caused by the pressure of the sac, for an extensive necrosis. A different diagnosis is easily made, however. In alveolar abscess the bone is smooth and dense; while in necrosis the sac having been mainly destroyed, is rough and filled with pus.

The cavities caused by the absorption vary greatly in size; the large ones seldom discharge their contents through the gum of their own accord; but may discharge into the nares, or antrum, or may be retained within the sac for an indefinite period.

Sometimes the septic irritation from the abscess is sufficient to create a cystic tumor large enough to destroy all of the bone of an upper or lower jaw. I have had cases in which the malar, as well as the maxillary bone had been destroyed. It is not always easy to determine whether you have an abscess or cystic tumor, or both to deal with. Farrar says that: "In many cases of abscess there is only a tumor—the interior of which often breaks down and discharges through the root; if the canal is clogged it is generally followed by a fistula." When this occurs a correct diagnosis is not difficult to make, as the fistula leads into the abscess. The diagnosis of what is known as a "blind abscess" is to the majority of practitioners a difficult matter. Many of our older men and teachers advise against disturbing them "lest an acute inflammation be set up which would necessitate a long and painful course of treatment." This advice is wrong, and should be ignored. The dreadful inflammation when it occurs, is always due to faulty methods of treatment.

Old Method of Treating Abscesses.

The old method, which is radically wrong, consists in enlarging the apical foramen, and through the orifice so made, forcing the medicine employed into the sac of the abscess, which has no other outlet through which the medicine and secretions can escape, except the narrow canal in the root through which the medicine was introduced. Could there be a more stupid and blundering process than this, and is it to be wondered at, that it should result in a "long and painful course of treatment" and failure? For when an alveolar abscess is treated in this manner, there is no permanent cure possible, for notwithstanding the applications made in this way, there will always remain at the apex of the root a diseased mass, which is ready on the slightest

provocation, and at any time, to produce a fresh inflammation, causing necrosis, or the nucleus of a cystic tumor.

The above method of treating alveolar abscess I know from my personal observation, is very often employed, and I have dwelt upon it, to show the great wrong and suffering that is often inflicted upon their patients by incompetent practitioners.

Abscesses on Temporary Teeth.

The nature of an abscess is determined largely by the rapidity with which it develops. And while the treatment in all cases is essentially the same, it must be varied in some instances to meet existing conditions. For instance, the pulp in a deciduous tooth might pain to-day and be dead to-morrow; and the cleansing of the pulp cavity should be done in the same way, as would be done were the tooth that of an adult, except that the pulp cavity and canals should be filled with Canada balsam or paraffin, but the tissue around the apex should not be disturbed. The alveolar abscess, however, which has been caused by the devitalization of a deciduous tooth, requires but little more treatment than lancing the gum to allow the pus to escape, cold applications to the face, and a saline cathartic. These means are usually sufficient to bring both speedy relief and a radical cure.

Abscesses on Adult Teeth.

In the adult, alveolar abscess may assume a variety of phases, but the cause is generally the same.

If in diseases of the mouth and teeth, the examation is made with the X-rays, the diagnosis becomes comparatively an easy matter, for by its use the extent and general conditions of the disease may be ascertained with certainty. By placing a very fine wire in the canals of the roots before the radiograph is made, the wire will show exactly the distance to which each canal has been opened, and how much of it has not been opened.

Treatment.

The first step in the successful treatment of any disease, consists in locating and removing its cause. When this has been done the removal of the disease and its consequences is usually a comparatively easy matter. In fact, the ability to locate and remove the cause of the disease under consideration, constitutes practically the knowledge and skill that is necessary to render any method of treatment effective. In some cases so much attention has been given to the treatment of the tooth most seriously affected that its devitalized and abscessed neighbor has escaped observation. Hence the inflammation with its attending symptoms, continues unabated by whatever kind of treatment may be given to the tooth under

treatment. But more frequently it happens that treatment proves unsatisfactory for the reason that so many practitioners do not know how to open the canals in a proper manner. They generally attempt to open them at an angle, which makes it impossible to reach the apex with anything but a bristle probe, with which instrument it is impossible to thoroughly empty and cleanse the canal.

Furthermore, I have learned that practitioners who depend upon this method overlook or never enter canals that are not easily located, and content themselves with the idea that the tooth is deficient in the usual number of roots. Enough of the masticating surface of the tooth should be removed to allow exposure of, and direct access to all of the canals. It is true that many of the canals, especially those in the first bicuspids and buccal roots of molars, are often tortuous and contracted, but to secure good results all canals must be found, opened and filled. This work including alveolotomy and the subsequent treatment, should be completed within a few days or weeks.

The successful treatment of alveolar abscess requires greater judgment and skill than any other dental operation. But unless successful, the health of the patient is jeopardized, and the foundation for fillings, crown and bridge work is "rotten" in every sense of the word. What is gained by making a magnificent filling or constructing a beautiful crown upon a crumbling foundation, or over a slumbering volcano?

I wish to state that my present method of treating alveolar abscess is not entirely original, as Dr. Farrar suggested root amputation some years ago, and Dr. Atkinson has been given the credit of curetting the sac—and I understand that Dr. John B. Rich practiced both these methods prior to either of these gentlemen entering practice, but I can not find that any of them ever published the details of their method or practiced it in all cases—but mine taken altogether is so simple and successful that at least 95 per cent. of all cases treated by it are permanently cured.

But I wish to state distinctly that the time required to carry out the treatment, or the pain caused by it, must not be taken into consideration. I am sure that a great many cases in the practice of others fail, because they do not allow themselves sufficient time to do the work properly. They are afraid to charge the patient for the time that is necessary to devote to the treatment of this disease. A large amount of time is often necessary to open the canals properly, and unless the dentist can be compensated for the time thus spent, he will not do the work thoroughly, and he will not be successful.

As already stated the first and most important thing is to enlarge the cavity in the masticating surface so as to allow direct access to all the

canals in the roots; they should be enlarged sufficiently to destroy all the large caniliculi which are always full of septic matter, which must be removed. So little attention is paid to this matter (the necessary enlargement of the canals)) that not more than one per cent. of the cases referred to me, have the canals opened in a proper manner, although I have always asked the dentist having the case in charge, to open all the canals and prepare them for filling; very few of them do it, even when I send the case back to them with an *earnest* request to open the canals to the apex or as far as possible. Yet notwithstanding, I often find that I must do the work myself or abandon it.

I believe that there are not more than five per cent. of dentists that are practicing now, who are capable of opening even the simplest canals; they usually try to reach the canals from a cavity in the mesial or distal surface of the tooth, and as I say, seldom open but one canal. Just how men propose to make tortuous roots antiseptic, without opening them, and removing the septic substance they contain, they do not pretend to give any explanation about. Some dentists boast that they can fill hair-like canals to the very apex; I never could.

I once sent a patient of mine to a dentist, a man in good standing, who had assured me he was an expert in opening the canals in the roots of teeth, and said that he would be glad to do such work for me, when I was engaged so that I could not do it myself. I believed his statement and sent one of my patients to him with a request that he would open the canals of designated teeth that I intended to treat, and prepare them for filling. After spending considerable time in attempting to do what I had requested, he sent the patient back to me, with a letter explaining that he had opened all the canals he could find, as far as he was able. Upon examining the teeth I found he knew nothing about what he had claimed to know so much, and that I would be obliged to do the work myself. He had not opened any of the canals more than one-third of their length. He sent me word that two of the upper molars had but two roots each, and that they were very short. The fact was that he had opened them but a short distance, and had not enlarged the pulp cavity sufficiently to expose the entrance to the anterior root.

After I had properly prepared the case, I referred it back to him that he might see his mistake. I do this in a way that will give no offense to the dentist nor lessen the patient's confidence in him. This is my way of teaching, and I feel repaid for my trouble when I see an effort upon the part of the dentist to improve his work.

When teaching in the New York Dental School, I required each member of the graduating class to bring me at least a dozen teeth (whose

roots I had previously incased in plaster of paris up to the crown) and open the canals perfectly and afterwards fill them, before he took his final examination.

These men, I am pleased to say, are among the five per cent. who are capable of doing satisfactory work.

About ten years ago, in discussing before the Second District Dental Society, Dr. Rhein's paper upon this subject, I demonstrated the impossibility of opening the canals of all teeth to the apex, which he declared he could do. This string of teeth I now exhibit, is the one I used at that time to prove the incorrectness of Dr. Rhein's assertion. I ask you all to examine them carefully, as they plainly show the difficulties that prevent success.

Root Amputation.

My way of procedure, after exhausting every means at hand to reach the apex of the root, is to fill the canal as far as opened, and to amputate at the point of filling, removing the portion cut off. Not infrequently the apex is softened by decay. In this event it should be burred away. The amputation in all cases is by no means an easy task, but it can and must be done. In most cases it is not a difficult matter.

The principal thing is to get rid of septic roots and amputate all and any part of roots that can not be thoroughly opened, disinfected and filled. I find that a very large percentage of dentists do not have even the necessary instruments with which to cleanse the canals, without mentioning the ones required to open them for disinfection; hence the large number of abscessed teeth and extractions. I think it is fair to place the percentage of dentists who make proper efforts to open the canals of molars and bicuspids at 20 per cent.; those who are eminently successful 5 per cent.; and those who attempt to treat all cases at one per cent. I make this calculation from a study of the cases dentists have referred to me, and from observing the treatment of others.

After the canals have been permanently filled, and if a painless operation is essential, it is my custom to inject into the gum a saturated solution of cocaine, first giving the patient 10 gtts. of volasem, which is a perfect antidote, and without which no more than a two per cent. solution of cocaine should be used. Even a solution of this strength should be guarded by a heart and respiratory stimulant.

After the elapse of a minute or two, plunge a drill in direct line with the apex of the root. If there is more than an acute inflammation a cavity will be found in the process, at the apex of the root. The amount of operating to be done will depend upon the extent of the cavity, and the condition of the root and surrounding tissues.

If the inflammation is slight, the mere giving vent to the congestion by the blood-letting which follows the withdrawal of the burs, is generally sufficient to effect a cure. The bur, however, should always be run over the end of the root, to break up the peridental membrane and allow any pus it may contain, to escape.

This simple operation is usually all the treatment required. The size of the opening necessary to be made through the gum and process, depends upon the extent of disease present, and whether or not a gauze dressing is necessary.

The cavity in the process or maxillary bone should be roughened with a bur or curette and the sac removed.

Caries may affect the apex of the root alone, or it may extend throughout its entire length. If you believe it possible to save all or part of the root, it should be cleansed of the caries, and the wound dressed as often as necessary until it is completely filled in with granulations.

To amputate the root I prefer a bur which will free itself. Always continue the amputation until the filling material in the root is reached, so as to be sure that no unfilled portion of the canal remains.

If the opening in the gum and process is large enough to readily allow the escape of the effervescing peroxide of hydrogen, I use it to boil out the debris and to check the hemorrhage—otherwise I syringe the wound with a solution of electrozone, 1-4 per cent., or with a 10 per cent. saline solution. Peroxide should not be used after the operation because it retards the granulation, if it does not destroy it altogether. The other named solutions are safer but even these should be used as infrequently as possible, and without force, because of the danger of breaking the blood vessels, which deposit the lime salts.

Should pus be found in the wound, you may be sure either that all septic matter has not been removed or that infection has occurred from septic instruments or dressing. Should it be due to the latter cause, injections of electrozone, followed with tincture of iodine, will usually render the wound sterile.

If the presence of pus is caused by diseased bone, a second operation may be necessary.

After Treatment. When the wound is large enough to allow saliva or food to enter it. I pack it with gauze, first to prevent secondary hemorrhage, and second, to stimulate granulation. The packing is continued until the cavity in the bone fills in and the wound is healed. Care must be taken not to allow the gum to heal over until the cavity is filled with healthy granulations, lest the serum or excrement from the wound becomes decomposed and causes reinfection.

It sometimes occurs in treating the grinding teeth, that the bur penetrates the antrum. When this happens, if the antrum is not infected it should be douched with a solution of electrozone or salt solution, to prevent the formation of a clot within it, which might result in sepsis. Afterwards pack the wound to the point of puncture in the antrum. Care should be taken thereafter not to force solutions into the antrum.

One or two days' time is all that is necessary to treat minor cases, and as many weeks for the ordinary ones. When there is much bone to be reproduced, six or eight weeks may be required and the wound may have to be dressed two or three times a week. The above detail is the method I practice and it is one which almost every dentist can easily learn.

I frequently operate and send the case back to the dentist from whom it came for subsequent treatment. I have observed that he sometimes mistakes the excrement of the wound for pus and pursues a line of treatment which is not only unnecessary but which really retards recovery. The microscope will quickly dispel any doubt about the nature of the discharge. The excrement should not be completely removed, as it is essential to rapid granulation.

Occasionally it will be found that closely associated with abscess is a cystoma. When this is the case it should be treated the same as the abscess.

At the clinic of the First District Dental Society, last December, I examined a case which at the time I supposed to be one of necrosis of the jaw following an abscess of the central incisors. Upon operating I found a large cystoma holding an ounce of fluid. Both incisors were abscessed and were surrounded with sacs holding about half drachm of pus. Dr. Truax has charge of this case, and I see it occasionally to observe the progress of healing.

I most earnestly desire to recommend this method to the younger and more ambitious members of the profession, and to urge them to practice it upon every abscessed tooth, until they have become familiar with the location of the apex of the root, and able to recognize the condition of the cavities in the jaw, by the touch of the instrument alone. When you get stuck I will be glad as in the past, to help you out. "Practice makes perfect" and few of us get enough of it to be worthy of this qualification.

There are present not a few to whom I have repeatedly demonstrated this method, and to some of them as long as fifteen or twenty years ago. There may also be present those who condemned this method when I advocated it in a paper which I read before the Fifth District Dental Society of New York, at Utica in 1886, and who are still denouncing it. Such an attitude not only dwarfs the mind of the man who maintains it, but obstructs progress and tends to hold the profession upon a narrow plane.

The Question of Tartar Formation.

By EDWARD C. KIRK, D.D.S., Sc.D., Philadelphia, Pa.

Read before the Second District Dental Society, Brooklyn, N. Y., February, 1906.

In asking your attention this evening to a consideration of the question of tartar formation, I desire at the outset to state that what I have to present is intended to be merely suggestive and general in its character, and for the purpose of arousing an interest in a line of inquiry, which, though it has been but little investigated, seems to me to be promising of fruitful results. As a matter of fact very little is really known about tartar formation. Various hypotheses have been advanced in explanation of the cause of these calcareous concretions, or earthy deposits upon the teeth, and some investigations of their chemical composition have been recorded, but as to the conditions that give rise to these deposits, or why in certain mouths they are abundant and persistent while in others they are absent, nothing has been clearly explained; in short, while our literature is comparatively rich in the presentation of devices for removing tartar and in discussions of its pathological effects, but little has been written as to its etiology.

That we have heretofore been principally concerned with the more obvious factors of tartar formation and the study and treatment of the irritative effects of these deposits is but natural, and that our modes of treatment should have been thus far empirical and mainly mechanical is a necessary result of our lack of knowledge of the deeper factors involved in the causation of these deposits. The progress which has been made in our knowledge of vital processes, especially of the chemistry of nutrition and of the phenomena of cell metabolism, together with the general advance in our knowledge of all departments of the art and science of healing, has compelled a different attitude of mind toward the disease problems which confront us as dental practitioners so that we can no longer rest content with empirical methods of treatment but must seek more and more for the original causative factors behind the phenomena of pathology in order that we may devise therapeutic measures that shall be in rational relation thereto and consequently more reliable in their curative effects.

A new attitude of thought has been developed by the results of the study of the etiology of dental caries, of the pathological phenomena of the dental pulp and of the relation of pathogenic organisms to many

of the diseases of the soft tissues of the oral cavity, and in proportion as our knowledge of those factors has enlarged so have our therapeutic procedures been modified and improved in accordance with the larger scope of our understanding.

Ravages of Tartar Considered.

The importance of the tartar question is scarcely secondary to that of caries when both are considered as causes of tooth loss. Caries has received the greater share of consideration, perhaps because in its more advanced stages it is productive of more acute pain and distress than is caused by the destructive ravages of calculary deposits upon the retentive apparatus of the teeth. Nevertheless I think most practitioners will agree that the number of otherwise useful dental organs annually lost through accumulations of calcareous deposits or by disorders in which such deposits are concerned is fully as great as the total number destroyed by caries. If I have overstated the case I am still safe in saying that the number of teeth thus lost is great enough to demand serious consideration at our hands and an earnest investigation of the problem, with a view to evolving more effective means to combat the disorder, than we seem at present to possess.

Tartar Classified.

I have not as yet had time nor opportunity to make an exhaustive examination of the literature of the subject, but from such research as I have been able to make it seems clear that two distinct classes of tartar deposits have been established and are generally recognized. The first arises from the precipitation of earthy salts from the saliva and the second from the blood plasma, designated respectively as salivary tartar or calculus, and serumal tartar or calculus, terms indicative of their origin. That form of tartar which is deposited from the saliva has been known and recognized as of salivary origin as far back as the records of dentistry. The blood origin of the serumal variety was first stated and recorded so far as I am aware by Dr. J. P. H. Brown before the Georgia State Dental Society at its annual meeting in 1870 (*American Journal Dental Science,* Vol. IV., p. 241). Much doubt has from time to time since then been expressed as to the possibility of a serumal origin of certain calcareous deposits upon tooth roots, but careful study of many cases has convinced me conclusively that such deposits do occur in positions and under circumstances which exclude the possibility of access of saliva. Beside which the analogy of the formation of calcareous concretions in old inflammatory exudates furnishes strong corroborative evidence of the possibility of tartar deposits upon tooth roots from the blood plasma. These two classes of tartar formations are so distinct

in character, mode of origin and in their effects as to require separate study.

Salivary Tartar.

Considering then salivary tartar as a distinct class of formation the first postulate regarding it to which I wish to call attention is that it is a disease phenomenon not only as regards its effects but especially as regards its production. That salivary deposits may appear upon the teeth with no tangible evidences of ill health discernible either by the patient or by the expert specialist I freely admit, yet on the other hand it must be conceded that in typically healthy mouths tartar does not form; therefore the persistent presence of tartar is prima facie evidence of some aberration, be it ever so slight, from the ideally normal balance of nutrition.

It has long been known that saliva as it issues from the glandular ducts into the oral cavity contains in solution a considerable amount of carbon dioxid; and that filtered saliva becomes turbid after standing owing to the escape of this dissolved carbon dioxid; and that this loss of carbon dioxid is accompanied by the precipitation of salts of lime, mainly its carbonate and phosphate. From these observed facts has originated the theory that tartar deposits are caused by the continual escape of carbon dioxid from the saliva and the precipitation of the basic carbonate and phosphate of lime upon the teeth. Examinations of tartar show it to be of irregular chemical composition, no two analyses being strictly alike, yet the two salts of calcium already referred to constitute its chief constituents with occasionally the presence of the corresponding magnesium salts or the ammonia-magnesium phosphate known as triple phosphate. Various other substances have also been found in tartar, e. g. the uric acid salts of sodium and calcium, lactates of calcium, organic matter, debris of food, bacterial elements, etc. These latter are, however, of minor importance for the reason that they constitute but an insignificant proportion of the deposit.

The theory which bases tartar formation upon the precipitation of lime salts from solution in the saliva through the escape of dissolved carbon dioxid appears to be well and scientifically founded, not only because the fact of precipitation of lime salts from the saliva has been experimentally demonstrated to follow escape or expulsion of carbon dioxid from the fluid, but because later studies of the part played by carbon dioxid as a waste product of metabolism furnish additional and corroborative evidence of the soundness of the theory in question.

The solvent power of carbon dioxid for calcium carbonate is well known, the most striking and familiar example of it in nature being that concerned in the formation of stalactites and incrustations in caves

and around mineral springs by water charged with carbon dioxid and holding calcium carbonate in solution. The solubility of calcium carbonate in water containing carbon dioxid is due to the fact that the carbon dioxid acts upon the basic calcium carbonate which is soluble, but as this latter compound is one which readily decomposes with liberation of carbonic acid the basic or insoluble carbonate is at once precipitated as soon as the carbonic acid escapes.

It has long been known that carbonic acid had the power to dissolve calcium phosphate. Attention is called to the fact by a paragraph quoted from Mr. W. H. Pepys, Jr., the eminent English chemist, in the first edition of *Fox's Natural History of the Human Teeth,* published in 1803. He states that "phosphate of lime mechanically suspended in water is speedily and completely dissolved by passing a copious stream of carbonic acid gas through it." Recent studies of this phenomenon reveal the fact that the action of carbonic acid upon basic calcium phosphate is to convert it into the acid phosphate and acid carbonate of lime both of which are soluble in water and that reprecipitation takes place when the carbonic acid is expelled from the solution by boiling.

It seems reasonable then to conclude from the foregoing data that the dissolved carbonic acid of the saliva may be and probably is concerned in holding the earthy carbonates and phosphates in solution and that the subsequent liberation and escape of carbonic acid from the saliva leads to the precipitation of these salts in basic form upon the teeth in the formation of salivary calculus. With this hypothesis as a starting point the question of carbonic acid formation in the body becomes an important and interesting subject in relation to the formation of tartar. Carbon dioxid, as we know from physiological researches, is one of the important and constant excretory products of cell metabolism and is one of the terminal or end products of carbohydrate oxidation. The oxygen necessary for the carrying on of the process of cell nutrition is carried by the hemaglobin of the arterial blood discs to the tissues and after performing its office of setting in motion the chemical transmutations collectively described as cell metabolism, is partially excreted in combination with carbon as carbon dioxid, which in a large degree is carried by the venous blood discs back to the lungs and exhaled with the expired breath. Only a portion, however, of the total quantity of carbon dioxid formed as a waste product of metabolism finds its exit from the body by way of the pulmonary outlet. Carbon dioxid is relatively soluble in aqueous solutions and a considerable portion of the metabolic carbon dioxid goes into solution in the blood plasma in which the red discs float. From

forty-three to fifty-seven volumes of CO_2 have been found in the blood in combination with soda to form carbonates and bicarbonates. The quantity of dissolved gas and that in combination with alkali bases is variable in different individuals, and is by no means constant in the same individual. I have elsewhere called attention to the important part which this dissolved carbonic acid in the blood plasma plays in converting the basic phosphates of the blood into acid phosphates and the significance of this function of carbonic acid in producing an excessive elimination of acid phosphates in the urine, the saliva and the secretion of the buccal mucous glands. I wish again to call attention to it here as a probable factor in tartar formation. The acid phosphates of calcium and of sodium are extremely soluble and as carbonic acid is directly concerned in the formation of these acid phosphates from the less soluble basic phosphates it is evident that where carbonic acid as a product of cell nutrition is formed in excessive amount there must be a corresponding increase in the quantity of soluble acid phosphates formed in the blood plasma.

Tartar a Phenomenon of Nutrition.

As a matter of clinical and laboratory study it has been found that where excessive carbonic production is going on in those individuals who are suffering from that type of malnutrition which is characterized by suboxidation we find the urine and saliva both loaded with phosphates and both markedly acid in reaction. I have not yet studied the question of tartar formation in these cases so that I am not at present prepared to express an opinion as to what extent if any this increased phosphatic elimination may be related to tartar deposits. It has been pretty generally accepted that tartar does not form rapidly in mouths of acid reaction but more accurate observation is needed before we would be justified in reaching a definite conclusion upon that point, especially as salivas frequently exhibit the amphoteric reaction to litmus, that is, they give both the acid and the alkaline reaction when tested separately with red and with blue litmus paper, so that before reporting the reaction of the saliva in any given case this feature of its not infrequent amphoteric character should be taken into account.

What I desire particularly to call attention to or rather to lead up to by bringing out the nutritional aspects of this question is to emphasize the point that we must, I think, regard salivary tartar formation as a phenomenon of nutrition and of abnormal nutrition at that.

If, as has been here suggested, an abnormal rise in carbonic acid formation, or its deficient excretion, is a principal factor in the elimination of lime salts during which process the urine and saliva become supersaturated with these compounds, then it would seem that we are

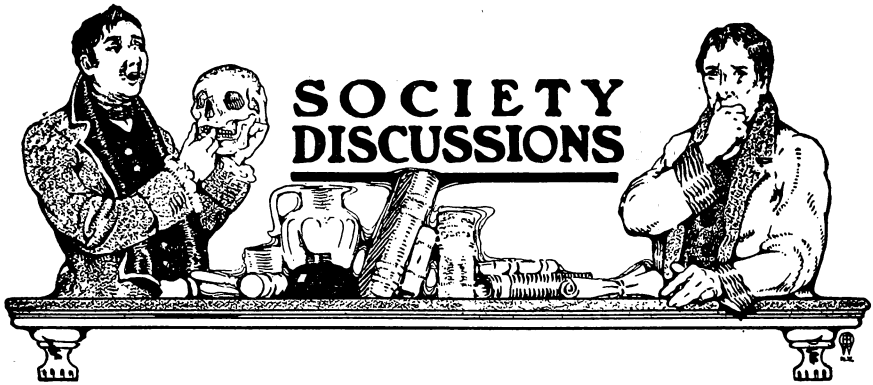
suggestively near not only to an explanation of the cause of excessive tartar formation but are in a position to definitely relate it to the particular type of malnutrition of which it is the probable indication. That excessive phosphatic elimination is a concomitant of abnormal carbonic acid production has been made out with convincing certainty from chemical examination of the urine of typical patients. Such studies of the saliva of these cases as I have been able to make show that the quantity of lime salts in solution is abnormally large. Not all cases of malnutrition of the suboxidation type, the hyperacid diathesis so-called, exhibit excessive tartar formation; indeed in the more phenomenal cases the teeth are, generally speaking, from tartar and the oral secretions are usually acid inreaction. In the less marked cases of those who exhibit this hyperacid diathetic tendency, the oral reaction is neutral or alkaline and tartar may be abundant. The malnutritional state characterized by suboxidation is one which progresses in the intensity of its manifestations as life goes on unless corrective measures are instituted and the clinical phenomena vary in character as the disorder develops; hence we may in the earlier stages find abundance of tartar deposited upon the teeth while later in life little or none will be observed, especially when chemical erosion of the teeth begins to manifest itself.

My purpose in presenting this view of the subject is to direct your attention to what has been a growing conviction with me, viz., that the local disturbance of the integrity of the dental apparatus from accumulations of tartar, while of great importance in itself, is by no means the only significance which these deposits manifest. There are strong grounds for regarding excessive tartar formation as a symptom of constitutional malnutrition, or some error in the nutritional state of the patient which should be corrected, and that certain facts which I have cited in connection with this subject rather indicate the particular type of nutritional error which is back of and responsible for the local condition.

Etiology of Serumal Tartar Formation.

The etiology of the formation of serumal tartar is a more complex subject, the chemical phenomena involved are elaborate in character and time will not permit more than a general reference to it here. I have not touched upon the important part played by the colloidal substances found in the oral fluids, notably mucin, in tartar formation also for lack of time. I would direct the attention of those interested in this subject to the able paper by Dr. E. S. Niles of Boston which appears in the *Dental Cosmos,* Vol. XXIII., p. 169, and to two papers by Dr. H. H. Burchard in the same journal, Vol. XXXVI., p. 1026 and Vol. XL., p. 1, respectively.

My main desire in presenting this very general view of the topic under consideration is to stimulate a study of tartar cases from the constitutional standpoint and to secure from clinical observation reports as to the nutritional status, the food habits, the hygienic conditions and the important factors of bodily exercise and rest that these cases present, so that with these and further scientific laboratory research we may be possibly able to arrive at a more comprehensive understanding of this very common disorder.



The Central Dental Association of Northern New Jersey, April Meeting.

President Vinson called the meeting to order.

There being a quorum present, on motion the calling of the roll was dispensed with.

The minutes of the last meeting were read and approved.

Dr. B. F. Luckey offered the following resolution:

Resolved, that we condemn the dentists who were responsible for the introduction on February 21, 1906, into the New Jersey Legislature, of Assembly bill No. 271, the purport of which was to remove the appointive power of members of the Examining Board from the State Dental Society, to the Governor, thus bringing the appointments into State politics and thereby nullifying the work of twenty years in advancing dental legislation.

The State and local societies have always jealously guarded the abilities and reputations of the men whom they have selected as members of the State Board of Examiners and New Jersey to-day has a most enviable and responsible position and reputation in the councils of the National Association.

In the name of this Society we most heartily thank the thirteen Senators who voted against the bill.

To the Senator from Essex County, Honorable Everett Colby, we can only express our dissatisfaction at his course in not only opposing the expressed wishes of a large number of representative Essex County dentists, but also the unanimous sentiment of his colleagues in the Senate. This, notwithstanding the large number of telephonic and telegraphic messages sent to him requesting him to vote against the bill.

The above resolution was regularly seconded.

Dr. B. F. Luckey. It might be well for me to make some explanation, as undoubtedly this is a matter that is perhaps more or less clouded in the minds of many members of the profession. This measure apparently was surreptitiously—and I use the word advisedly—introduced into our Legislature. If any dentist in New Jersey was dissatisfied with the existing law, as a matter of courtesy alone he owed it to the dental powers of the State at least to acquaint them with his intention of seeking an amendment. This law was introduced by an Essex County member of the Assembly, Mr. Serbe, who was interviewed by Dr. Meeker and myself at Trenton last Wednesday, and on being asked his reasons for introducing the bill he said it was given him by a Newark lawyer with a request for its introduction. Mr. Serbe declined to state who the lawyer was unless we insisted upon it, which as gentlemen we could not do. On being asked if he understood the bill he said that he understood the dental commission was a board of five members who annually re-elected themselves to office thus constituting a close corporation which the law could not touch, composed of men who constantly remained in power, and therefore he believed it was a bad thing for the State and thought the appointments should be placed in the hands of the Governor. We informed him of his mistake and he expressed his sorrow that he had not understood the bill.

The first knowledge I obtained of the existence of this proposed law was a telephonic communication from the secretary's office in Newark on Tuesday afternoon last at half-past three. I immediately communicated with Senator McKee of my county asking him to defeat or postpone action on the bill and telling him I would follow. I went down next day and found Dr. Meeker there. In the meantime wires, both telephonic and telegraphic, had been kept hot, and many of you know of the notices you received to urge your representatives to vote against this bill.

When I arrived in Trenton I found that the bill had been defeated by a vote of 13 to 1 and the one, the only one, who voted for it was the new light, the new star that sprang into the heavens last election time, the model reformer of Essex County, Everett Colby; the man who wished to take the power that existed originally in the people and now, as he claimed, was lodged with the politicians; to take it and place it where it belonged; that man was the man who voted to take it from the people as represented by the State Dental Society, who know, if anybody on God's earth knows, who and how to select members of the Board of Dental Examiners, and place it in the hands of whom? Of

the Governor, a politician! This was your reformer from Essex County and this was the gentleman of whose action we wish to disapprove.

We as dentists feel an interest in this matter; we are not politicians; many of you gentlemen are friends of Mr. Colby and many of you probably voted for him.

Mr. Colby in a communication with our honored president over the telephone promised to look into this matter and do what he could, saying if it was not right he would vote against it. Mr. Colby did not vote against it; if he did not understand the bill he should not in my opinion have voted for it, and if he did understand it in my opinion Mr. Colby is a political fakir.

This perhaps is aside from the question that interests us as dentists; the point is this: we wish to place upon our record books, our disapproval of the action of any dentists who would go surreptitiously to our legislature and try to have enacted a law that is inimical to the interests of our profession.

There is no man outside of the profession of dentistry who is competent to select a competent examiner, or a Board of dental examiners; there is no individual perhaps within our own ranks who, as an individual, could make a proper selection; but when this power is lodged in a society composed of some two hundred members of the profession, you may rest assured that they will never make a mistake. They never have yet; there has never been a man on this Board who has not been an honor to it. Could we say as much for the board forecasting the future along political lines, if this bill had passed? Can we not all see the power that the Governor would have of appointing on that board men who would be a menace and a danger and a source of constant trouble? This bill provided that the appointee should have practiced dentistry in the State of New Jersey for five years—that is all.

Gentlemen, I do not think there is a man present who has the interest of the profession of dentistry or the interest of the public at heart, who can feel otherwise towards this matter than I myself feel, and I hope each gentleman here will vote for the adoption of this resolution. (Applause.)*

* (The following resolution was passed by the Monmouth County Dental Society, dealing with the same matter.—*Ed.*)

Resolved, That we the members of the Monmouth County Dental Society at our regular meeting held at Freehold Tuesday evening, May 8, 1906, do heartily condemn the action of those parties responsible for the introduction on February 21, 1906, in the New Jersey Legislature of Assembly Bill 217, the purport of which was to remove the appointive

power of members of the examining board from the State Dental Society to the Governor. Believing such an action would not serve the best interests of the dental profession in our State, in the name of the society we thank those Senators who voted against the bill; especially our own Senator O. H. Brown of Monmouth County.

H. S. TAYLOR,
Secretary.

There being no further remarks a vote was taken and the resolution was unanimously adopted.

The Secretary read an invitation from the Southern Dental Society to attend its meetings on April 18, and May 16 and 17.

On motion the above invitation was accepted with thanks.

The Secretary requested all members to send him their correct names and addresses as considerable confusion existed in this regard, and he desired to make up an accurate roll book for the use of the Society.

On motion the resolution offered by Dr. Meeker at the last meeting to amend the constitutional by-laws so as to provide an annual salary of twenty-five dollars for the Secretary, was laid upon the table.

The President then introduced G. Lenox Curtis, M.D., of New York, who read his paper:—

Discussion of Dr. Curtis's Paper.

Dr. B. F. Luckey. I have listened with a great deal of pleasure to the reading of the paper. We all regard Dr. Curtis as a graduate from dentistry into oral surgery and one whom we look upon with pride and respect.

Taking for my text the title of the paper, "A plea for the uniform treatment of alveolar abscess," I should say that the central thought of the paper is not the method that Dr. Curtis may advocate or pursue in the treatment of alveolar abscess, but the more important matter of establishing a uniform mode of treatment. I think the plan that he has submitted is an admirable one; not that the National Association is composed of more able men than is this or any other society; they are simply graduates from the different societies of the country; they are simply dentists, some better than others and, I might say, some worse than others, but they are the highest recognized organization in this country. I believe such a committee of unprejudiced and able men disassociated from college work would do more to establish a uniform treatment of this disease on a substantial and scientific basis than could be done by any other method we have ever had committed to us. I have

nothing but praise for the proposition. I do not believe this is the time or place to discuss our own individual methods of practice for the cure of this disease. Dr. Curtis has minutely outlined his method, and nobody here will question that it has merit; other gentlemen here have had experience in the treatment of this trouble and some are very fixed in their views. A good many are very obscure and a good many approach each case with fear and trembling, without any definite ideas of procedure, except that they know it is necessary to open and to relieve the pressure of gas and pus, and to sterilize. Perhaps if most of them stopped at that point they would be more successful than they are when continuing medication, for their medication is sometimes past understanding. The usual result is failure. I never knew before that Dr. Curtis was a mathematician, and I hardly know to-night whether I am in the five per cent. class or the ninety-five per cent. class. I never felt that I was able, in fact I am willing to make an affidavit that I never was able to open every canal that came under my hands; in very many of them I have done a good deal more and gone a good deal further than I hoped to or the patient wished me to! Whether Dr. Curtis will put me down in the five per cent. or the ninety-five per cent. class I don't know, but this I do know—I have discovered to-night why the successful extractors are so wonderfully prosperous, for I learn now that they derive their practice from the ninety-five per cent. who do not know how. I am reminded of the remark of Dr. Thomas, of Philadelphia, who once made the statement before our New Jersey society at Asbury Park that he had a mortgage, and he knew he had a mortgage, on every pulpless tooth that had been treated or filled within a radius of one hundred miles of Philadelphia—and I think he came pretty near being right. However, I do not believe that men of experience will lose ninety-five per cent. of their cases, for I believe we would abandon treatment of teeth if that were true, for we would know that we were practicing dentistry unsuccessfully and to the detriment of ourselves and our patients.

I can say no more than that I am thankful to Dr. Curtis for his able paper. I have been very much pleased with the proposition to put this question upon a practical and scientific basis and I have been more than pleased to hear with definiteness his method of overcoming this dread disease, alveolar abscess.

Dr. L. C. LeRoy, New York.

It seems to me that this paper, as Dr. Luckey has said, must be discussed on rather a broad basis and not confined to individual dissertations concerning our own methods. But the plan as outlined by Dr. Curtis is admirable, particularly as an education to the student.

The treatment of these hair-like canals in the teeth the Doctor speaks of is one of those bugbears that we meet with. There are some who contend that they all can be opened and treated and the canals filled, and there are some who contend that they can not. They can all be opened; I do not say that all those teeth may be saved, but if two of those roots have such hairlike and tortuous canals that they can not be positively opened for probably not more than one-half their length, and those roots are amputated, that tooth is so materially weakened that the use of that side of the mouth becomes somewhat lost to the patient; it is a lame tooth and the patient naturally resorts to the use of the teeth on the other side of the mouth and permits a deterioration from the fact that the other teeth do not have a proper use.

The instruments which are in the hands of many are rather limited. The essayist has suggested the use of some which I am acquainted with and I think if we take proper notice of that we may probably do better in the treatment.

Prolonged treatment is another matter which some advocate but I think the salvation of most cases I have treated has been the fact that I have treated and filled canals at one sitting.

Dr. William Hall, Sieberst, N. Y.

I feel, in accord with Dr. Curtis's paper, that we should have some universal treatment and at the same time, if you stop to think it all over carefully, you will realize it is carelessness which prevents us from accomplishing what we desire in the cure of alveolar abscess. I remember when I graduated at the University of Michigan, all that the Professor on Oral Surgery said about alveolar abscess was, "Boys, remember when you meet alveolar abscess the first thing is to get free drainage," and that is all we knew about alveolar abscess, and we were thrown out in the world to mingle with our patients in that way. When I got into practice I had a great many abscessed teeth and I was associated with a physician who helped me a great deal and I am satisfied now that a great many of my cures were the result of surgery.

In the treatment of alveolar abscess, much time and careful treatment must be devoted to each case; shotgun treatment is out of the question and amputation of the root is necessary and the radical treatment that Dr. Curtis advocates in his paper is absolutely necessary. If the young man coming up in the profession could have a method of curing this disease there would be many more teeth saved. But as I said, many cases of faulty treatment are the result of carelessness. A man will receive a patient with an abscessed tooth and the first thing he thinks about it is "How am I going to get into that tooth; it is so

sensitive that I can not touch it, and there will probably be a cavity on the side of the tooth where the canal is almost inaccessible," and he says to himself, "Oh, the devil! pull it out." He is disgusted with the position; or he might treat it for three or four weeks, not thinking that if he took a drill and went directly to the root he might achieve far better results. I have had patients who would not allow me to put an instrument near the tooth and I have chloroformed patients in many instances and proceeded to open root canals, and I have treated the roots as Dr. Curtis advocates.

The paper to my mind is a timely one, but I also think it will be hard for Dr. Curtis to accomplish what he is attempting, unless he can read such papers to different societies and stimulate dentists to be more careful in their own practice.

I mentioned to Dr. Harlan that I was coming over to-night and asked him what he thought about it and he said, "I think the universal treatment of alveolar abscess would be a great thing, if it could be made to be a great thing." He is a man who has had years of experience, but at the same time he would not try to tell you how to treat an alveolar abscess. If we all undertook to do that we would have some five thousand different methods and a great many of us would be in a class all by ourselves, neither in the five nor the ninety-five per cent.

President Vinson. Dr. Curtis said in his paper, a uniform system of treatment of alveolar abscess should be installed in the minds of the young men. Now we have a young man with us to-night, Dr. Rich, of New York, who is ninety-six years old and who has practiced dentistry for seventy years, and who is known as the father of contour filling.

John B. Rich, M.D., D.D.S., New York. With the experience that a long practice has given me (63 years) I have no hesitation in stating that the greatest difficulty I have experienced in the practice of dentistry, has been in the treatment of a certain class of devitalized teeth. I have reference to that class where the pulps have from some cause lost their vitality, and remain in the pulp cavity in a state of decomposition. Where this condition exists, there is always an abscess at the apex of the fangs, and the dentine of the crown and fangs are saturated with putrescent matter. Now this dentine must be purified of the putrescent substance, thoroughly disinfected and made absolutely antiseptic, and then treated in such manner that it will remain so. If this is not done those teeth are sure to give trouble in the future.

Some persons may think it is a very easy matter to treat such teeth,

but I tell you that it is a condition that requires more skill, more knowledge, and more patience and time for its absolute cure than any other disease I know of that the dentist is called upon to treat.

It would appear from the paper presented by Dr. Curtis, that the efforts which began seventy years ago, to try and elevate dentistry by providing for those who desired to practice it in a scientific manner, the means of acquiring a thorough knowledge of the principles and practice of a uniform system of dental science, has proved a failure, and that the hopes of those men who at that time banded themselves together and strove so earnestly to furnish such facilities have not been realized. Why have their efforts failed? And why do we find so many different methods of treating alveolar abscess in use by the practitioners of to-day, most of whom are graduates of some one of the dental colleges? All of these colleges claim that their graduates are qualified to practice the profession of the Doctor of Dental Surgery in all the departments of that profession, according to the best known methods. And yet according to Dr. Curtis's statement, very few of them have taught their graduates any certain method of treating alveolar abscess. Is it not strange that in all these years that they have been in existence they have not formulated some reliable means of dealing with this very common disease? To me it has been a great disappointment, for I am the only one left of that band of men who seventy years ago made a determined effort to establish some system of dental education, with the hope that our calling might be rescued from the slough of ignorance and charlatanism by which it was then surrounded, and elevated to a respectable place in the communities in which we lived. We were a small body of men, but led by that pioneer champion of dental education, Horace H. Hayden of Baltimore, we worked hard and persistently to accomplish our object. And finally we succeeded in establishing a dental college, the first one in the world's history.

This was a great success considering the material we had to work with, for at that period seventy years ago, the grade of education and intelligence among dentists as a body was very low. But even at that time in the large cities all over the United States there were to be found some well educated men practicing as dentists; they were the exception to the rule, and the universal success that was the result of their intelligent practice, showed conclusively that there was a large and lucrative field in this country, where the masses are prosperous, for the educated dentist. And that fact was the basis of the arguments we used when advocating the cause of dental education. This education of the dentist has been steadily going on since that time. I need not tell you

how those colleges have multiplied, nor how the status of the dentist has changed, for now the average intelligence of the dental profession will compare favorably with any of the liberal professions. But I am ashamed to know that the profession in whose ranks I have practiced so long, worked so hard for its advancement, and been so proud of, should have faltered in its progress towards a perfect knowledge of everything connected with its practice, as it has done in the matter of developing a certain means of treating this disease.

As far as the paper of Dr. Curtis pretends to treat alveolar abscess, it is the best paper I have ever heard read on that subject. He has hardly laid stress enough upon one item, for it is of the first importance in treating such cases, and that is that you must have plenty of room to work; the pulp cavity must be enlarged until every part of it can be reached in the exploration for the pulp channels in the fangs. And when these channels are found they must be enlarged down to their apex so they can be cleared out and made thoroughly antiseptic, and treated so they will remain so.

I have been asked to explain my method of treating devitalized teeth. I would be very much pleased to comply with that request, but there is not time this evening to give the details of the treatment, and without the details the description would be of no value.

Dr. Curtis mentioned another matter that I think he might have presented more forcibly, and that was the statement "that the time it takes to treat an abscess properly, must not be taken into consideration." In other words, all the time necessary must be devoted to the treatment to make it successful. Now this is a vital matter about the treatment of alveolar abscess, and unless the dentist can afford to devote the necessary time to this task, he ought not to undertake it; it is an operation for which he must be well paid; if he is not, as a rule, he will not devote enough time to its treatment to make it a success.

In relation to the lapses of the profession as regards the treatment of alveolar abscess, I have often been asked who is responsible for the great variation by different practitioners in the treatment of this disease as stated in Dr. Curtis's paper. And I say that it is primarily the fault of the professors of operative dentistry in the different colleges, and secondarily the fault of the National and State Societies, who have allowed such a condition to exist without comment or reproof. Now the discussion of Dr. Curtis's paper does not imply that I am opposed to it, for I am not; on the contrary I am heartily in accord with him in all the material points he has stated in it.

In regard to the plan he proposes to bring about a uniform plan for

treating alveolar abscess, it appears to me to be a most admirable one. And if adopted and put in operation by the National Dental Association, and the National Association of Dental College Faculties, would most certainly bring about the much needed reform he has called our attention to, and entitle them to the most grateful thanks of the whole dental profession.

Dr. C. F. Morrison, Montreal.

I do not think it is for me to attempt to discuss this paper to-night, but as I am a stranger here I will explain how I come to be present. I came down to New York this morning with a patient for Dr. Curtis to operate upon and he suggested that I come over here to-night and I have had a great deal of pleasure in being here. The suggestions in Dr. Curtis's paper can certainly be highly recommended and I hope that in the competition he has suggested he will himself contribute a paper.

When I picked up the menu to-night I noticed the letters C. D. A. and they seemed very familiar for we have an association in Canada known as the Canada Dental Association and I should like to extend to all of you an invitation to come to our annual meeting if you are in Canada at that time.

Dr. S. C. G. Watkins.

I have listened to Dr. Curtis's paper to-night with a great deal of interest and the plan which he has put forth with regard to a universal treatment, is, I think, a first step in that direction, and if carried out it seems to me it will be an excellent thing. I think some effort should be made to bring the idea before the National Association and see if the suggestion can not be adopted.

As Dr. Rich has said, it is certainly a remarkable thing that alveolar abscesses have been treated for seventy years and no uniform method of treatment adopted.

Dr. Curtis spoke of receiving many cases where the canals were not properly opened. I have also seen many cases where men had attempted to open the teeth and treat an alveolar abscess, where they would simply drill a hole into the main body of the pulp chamber and expect to treat the canal by forcing medicine in without opening the canals in the roots at all. Then again we constantly hear men speaking of treating these canals and filling them without enlarging them. Such a thing has always seemed to me absolutely ridiculous. I am not good enough a dentist to do it—they may be.

Then again there are many men who are in the practice of treating abscess frequently; they seem to think the patient must come about every other day to be treated and they keep that up for indefinite length of time, which it seems to me is absolutely wrong.

I was delighted with this paper to-night and with Dr. Curtis's positive way, for if there is one thing I do admire it is something positive; I like to see men when they are going to do a thing know why they do it, and do it in a masterly way. I love a master of the situation. I do not know when I have enjoyed anything so much as I have to see that man (Dr. Rich), ninety-six years old, stand up here and in such a lucid way describe the treatment right up to the present time just as well as any young man in this city or in New York City, or in any other place, could have done it. (Applause.)

Dr. Rich. Why should he not with all the experience he has had?

Dr. Watkins. We naturally look for men when they reach ninety-six years of age to lose some interest, but you have not lost any.

Dr. Rich. I don't mean to as long as I live. I have to say to you, gentlemen, although I do not want to interrupt the speaker, that when I entered this profession it was a low down, miserable thing in a pool of mud, and I was one of those who pulled it out and I am ashamed that it has not made better progress in this direction than it has.

Dr. Watkins. As I said before it is a grand thing to listen to a master. Recently in Montclair Josef Hoffman appeared, and while there were present many young men of sixteen or seventeen years of age not one of them stirred or moved a muscle while he, the master, was playing; he held them spell bound.

There is everything in doing a thing for the sake of doing it and for the love we have in it and doing it with our soul in the work, and if this work is entered into in this spirit very many more cures will be accomplished than otherwise.

I am reminded in this connection of the following little poem, "The Gospel of Art," by Kenyon Cox:

> Work thou for pleasure, paint or sing or carve
> The thing thou lovest though the body starve.
> Who works for glory misses oft the goal;
> Who works for money coins his very soul.
> Work for the work's sake then, and it may be
> That this thing shall be added on to thee.

Dr. L. Curtis. It is gratifying to me to have this association so heartily approve my views, especially those advocating the adoption of a uniform method for the treatment of alveolar abscess.

I have no doubt about Dr. Luckey being in the "five per cent. class," for I believe him to be a very competent dentist. His remarks about Dr. Thomas's statement, that he "had a mortgage on all abscessed teeth," etc., and those of Dr. Siebert, echo my sentiments of the ability of some men to teach, and show pretty conclusively how few dentists there are who treat the disease intelligently.

Dr. LeRoy seems to be of the opinion, that where roots of teeth are amputated, the bone does not fill in above it sufficiently to allow the tooth to become firm and entirely serviceable. This is not my experience. I believe wherever the bone is reasonably firm about the teeth, except at the apex, that the tooth will become firmly anchored and be practically as useful and comfortable as before it was diseased. Should all the roots be so diseased that they require amputation at the bifurcation, I doubt the wisdom of saving the tooth with a view to usefulness. If only half or less of a root is amputated, the tooth should become firm enough for practical use, but where there are two or more roots of a tooth one can be removed without materially disqualifying it. I not infrequently amputate one root of a molar or bicuspid and find the remaining root supports the tooth satisfactorily. A healthy condition usually follows the treatment as outlined in my paper. I am inclined to think that had the teeth referred to by Dr. LeRoy been treated as I suggest they also would be useful and the bone about them firm.

Only a couple of years ago I saw a patient for whom I had removed the anterior root of a molar twenty years ago; up to that time the tooth had remained useful and the gum healthy all these years.

A month ago I saw another patient for whom I had treated several abscessed teeth, as outlined in my paper, twenty-one years ago; they were very badly abscessed, and were so badly decayed that gold crowns had to be put on them. The patient told me that he had not had one particle of trouble with these teeth from the time I finished treating them, and so far as I could see the gums and crowns were in perfect condition.

Dr. Rich is a wonder to me. Just think of a man ninety-six years of age maintaining his interest in his profession as he has. The clearness of his ideas, and the emphatic manner in which he shows the reasons why dentistry is being only half taught are convincing, and must impress you as they do me. I hope his remarks may be published along with my paper, for they can not but make those who read them think that something on the line of what I have suggested should be adopted if dentistry is to be maintained on the high plane on which some of the profession are endeavoring to place it.

It is certainly appalling to see how few teachers there are, who successfully treat alveolar abscess. How are students to learn when taught by incompetent men? Some colleges pretend to teach surgery of the mouth. I ask you to look among them and see how few professors personally can, in this branch, successfully treat alveolar abscess or pyorrhea alveolaris. The successful treatment of these diseases—more than all others—should be taught.

I happen to know a professor of recent appointment, the dentist of a patient whose mouth is not much short of a cesspool, owing to a large number of abscessed teeth and the gums being badly affected with pyorrhea alveolaris.

If a surgeon is so wanting in knowledge on these most important subjects, how can he be expected to know any more on the many other diseases he is expected to treat?

Dr. Abbott taught his students not to open canals, but put some antiseptic over the dead pulp, which he thought might preserve them. Then later he advocated mummifying them.

Did any dentist ever have so many abscessed teeth to treat as he? He once wrote me, when he was invited to attend a convention held in Syracuse, "I have so many abscessed teeth to treat that I can not afford to be away from my practice a single day, lest my patients go elsewhere and I lose them."

I look upon mummifying pulps as an outrage upon the person on whom it is practiced.

If a crusade of observation upon the methods of teaching in our dental colleges were made and especially on the method of treating devitalized teeth, how few professors there would be found who see to it, that their students know how to prevent teeth, in which they devitalize the pulp, from becoming abscessed.

Is it any wonder that Dr. Rich says there has been little advancement made in the teaching as regards this disease, in the last seventy years, and that he feels ashamed for the profession? I hope the profession itself will become ashamed and will take a new stand in its efforts to correct this evil.

I see no help for the student nor for the profession, so long as commercialism is the standard, and money and influence are the qualifications for obtaining professorships. The distorted roots of this string of teeth which you have seen to-night, demonstrate conclusively how impossible it would be to open to the apex of all canals—likewise the importance of amputating the roots of such teeth when they are devitalized.

Then too, they show how important it is to open freely the pulp chamber, so that the canals of all roots may be exposed.

I have observed that anomalies in teeth occur perhaps more frequently than in any other part of the body.

On this string are lower cuspids and bicuspids with two roots, upper bicuspids and lower molars with three, and upper molars with four and five roots; while some molars have but one root. These roots can usually be located if the pulp chamber is widely opened.

Not long since I was asked to locate the cause of a persistent pain in a lower cuspid in which the pulp had been removed and canal filled. The filling had been carefully removed, so that I might see that the canal had been opened to the apex of the root. I enlarged the cavity in the lingual surface of the tooth which was altogether too small for thorough cleansing, or to allow sufficient space for exploration. I found that the tooth had a supernumerary root, in which the pulp was vital—hence the pain. The pulp was removed and the trouble ceased. From the fact that the pain was the same as that in pulpitis, I was able to make the diagnosis.

Now when such teeth are abscessed is it any wonder the dentist who extracts them exclaims when holding the tooth up to the patient's view: "No wonder I could not cure it—see the extra root."

Did it ever occur to him that his crown might have one more root and that if he had only found, opened, and treated this extra root he would have saved the tooth?

Does it not seem that there is a great need for a better and more uniform method of practice? (Loud applause.)

On motion a vote of thanks was extended to the essayist and to the gentlemen who had discussed the paper.

President Vinson stated that at the next meeting he would appoint a committee to confer with the National Dental Association in an effort to further the carrying out of the work outlined by Dr. Curtis in the paper of the evening.

On motion adjourned.

Second District Dental Society.

Discussion of Dr. Kirk's Paper.

Dr. C. O. Kimball, New York.

In studying Dr. Kirk's admirable paper, it has been a matter of great interest to me to note the accuracy with which he has drawn his conclusions; and especially the one that the changes that occur in

the physical system are really at the bottom of the formation of tartar. It interested me so much that I made a brief analysis of his paper, which I had intended reading to you, but Dr. Kirk has forestalled that by making the analysis himself. The substance of the whole matter seems to be that the storing up of carbonic acid in the blood brings certain elements into the saliva, among other an excessive quantity of the lime salts, which results in the formation of tartar. As regards the clinical history of the case—for I can not go into the chemical side of the matter—the first thing we notice in the deposits of tartar is suggested by the place in which we find it. It evidently comes from the saliva. We find it in most marked quantities around the lower teeth and the outside of the upper teeth, thus proving by its very position that it comes from the salivary glands. There may be rare cases where no tartar deposits are found, but beyond question tartar conditions exist in the average human being. In the course of a long practice I only recall one patient whom I saw regularly (and in this instance during a period of perhaps twelve years) where tartar did not exist. In all that time I never had occasion to remove tartar once. I do not propose to prolong these remarks much longer, gentlemen, for I feel that the paper of Dr. Kirk has been so clear and suggestive that we should each watch the clinical history of every case that comes before us to see what relation the health of the patient bears to the amount of tartar found on the teeth. We can all recall cases where the general condition of the health of the patient has been closely associated with the health of the teeth, with the amount of tartar deposited and the general condition of the teeth and gums, and yet as I have been thinking over the past years and various cases I am surprised to recall that sometimes the rule has not worked; that soundness of health has gone with a good deal of tartar, and lack of health has been accompanied with a comparative freedom from tartar. It may be that such cases if carefully studied would show conditions of the urine and saliva which did not appear in the outward condition of the patient. I think that the subject brought before us is one that should stimulate interest, care and watchfulness in our daily work, and it is with that hope that I give way for further discussion.

Dr. Wm. Jarvie, Brooklyn, N. Y.

This subject is not only one of great interest, but is also of greater importance than has usually been credited to it. Dr. Kirk started his paper by the remark that a great deal has been written and said as to the origin of the calcareous deposits upon the teeth, and that there is a diversity of opinion as to whether there is such a thing as a serumal calculus.

To my mind the chief point in Dr. Kirk's paper is his statement that evidence may be found in the mouth as to the general condition of the patient, and I think that the conditions found in the mouth are much more important than they are considered to be by medical men in general. It is undoubtedly a fact that the nature and condition of the saliva varies in the same subject with the varying conditions of his system. I believe the time will yet come when through the mouth we will find indications of constitutional disturbance, and I hope that Dr. Kirk and others who are of a scientific turn of mind will follow up investigations of this sort, and if they do I know it will not only be a great help to us as dentists, but also to those who are practicing medicine. In conclusion I want to say that I feel that we are fortunate in having men like Dr. Kirk in our profession.

Dr. D. W. Barker, Brooklyn, N. Y.

I would like to have Dr. Kirk tell us in summing up whether he has given much attention to the effects of mouth breathing upon tartar deposits. I find that that is a habit with a good many people who are troubled with a large collection of tartar. It has been my custom to ask patients if they practice breathing through their mouths, and it is surprising to learn how many admit that they are. Many are accustomed to sleep with their mouths open, and that without being aware of the habit. I believe that many mouth breathers are the subjects of large deposits of tartar, and I would like to know if Dr. Kirk has considered the matter and what he thinks of the probable results pro and con.

Dr. J. Lowe Young, New York.

The paper to-night has been of very great interest to me, and a couple of thoughts came into my mind in regard to the deposits we find on the teeth. If these deposits are the result of a diseased condition I think it is without question that they must be due to malnutrition. The question of abundant deposits of tartar in the case of mouth breathers brought up by Dr. Barker might be readily explained by the fact that invariably where we have children who have been in the habit of breathing through their mouths for any considerable period of time we have such malocclusion of the teeth that it is absolutely impossible for them to properly masticate their food. I think that there is nothing as good for the gums as thorough mastication of proper food, and lack of mastication has more to do with malnutrition than anything else.,

Now as to the question of mouth breathing being a habit: I do not believe that it is. I believe that the child invariably starts to breathe through his mouth in order to get enough oxygen into his system, and if allowed to continue for a number of years the deformity is such that

the child can not close his mouth without an effort. In such cases the physicians are not doing their whole duty when they remove the adenoids and do not insist on the malocclusion being corrected, for recurrence of adenoids is sure to follow in such cases.

Dr. H. Clay Ferris, New York.

I wish to take this opportunity of thanking Dr. Kirk not only for the article that he has presented to us to-night, but also for his previous writings on the subject. They have been of great benefit to me in cases where the doctors returned a negative report in the examination of the urine, as it caused me to send these people to a stomach specialist who would make an examination of the gastric juices, and give me a report, and in almost every instance we would find that a pathological condition existed. By following up that line, putting the patient on a diet, the results were very satisfactory in every case that I have handled. I am very glad of this opportunity to show my appreciation to Dr. Kirk for his contribution to this branch of our science.

Dr. James G. Palmer, New York.

I can not add anything to the subject under discussion except to refer to one or two things that our patients ask us frequently: "Doctor, where does the tartar come from? Why do I have so much tartar on my teeth, especially as I brush them carefully every day?" Until I listened to Dr. Kirk this evening I have not had a satisfactory answer to give my patients, though I have always had a feeling that it had something to do with the general condition of the system, but I never realized that it was so intimately connected with that condition until now. I shall hope in the near future to hear from the Doctor again on the subject, and to know more about it than I do now.

Dr. Kirk.

It is always a very gratifying thing to me to come to Brooklyn, because I invariably meet Dr. Jarvie, and he always lets me down very easily. This evening he has been kind enough to give me the assurance that it was not my anticipated paper, but the holiday and the weather that combined to make the attendance so small. The character of the discussion that we have had on this subject has certainly been complimentary and gratifying to me. The topic of the paper is merely a suggestion that has been in my mind for some time. I hope that I have not conveyed the impression that I have attempted to present an exhaustive article on the subject. The whole question of tartar formation is a very complicated problem. There are a variety of ways in which tartar may be formed. I did not intend to go into all the details of the formation of tartar. It seems pretty evident from what studies have been made of the subject that any condi-

tion of the salivary calculus that will cause precipitation of calcium salts will also carry down with it mucous secretions and thus form tartar.

I think there can be no reasonable doubt that mouth breathing is related to tartar formation at least as a contributory factor. The constant interchange of air currents brought about by mouth breathing necessarily tends to cause evaporation of films of saliva and mucus upon the teeth. This on the one hand would result in loss of the dissolved carbon dioxid of the saliva, with consequent precipitation of lime salts in a mucoid medina concentrated by evaporation, or inspissated by the loss of water with the final effect of tartar formation upon the protected tooth surfaces. Proper mastication of food is important as a prophylactic measure against tartar formation, not only in a mechanical way but from the nutritional standpoint. If we concede the point, as I think we must, that excessive tartar formation is evidence of some nutritional fault, then imperfect mastication in so far as it may tend to the production of mal-nutrition may also be a predisposing cause of tartar formation. It is principally the nutritional aspect of the question that I have endeavored to bring to your attention this evening. I am extremely desirous of obtaining fuller data on the subject, and I hope that the purpose of the paper may commend itself to your sympathetic consideration, so that you will be willing to make a study of the food habits of those of your patients who exhibit a marked tendency to the excessive formation of tartar. By this line of inquiry we may be able to gather more light upon this unsolved problem of dentistry.

EDITORIAL

The California Sufferers.
A Last Appeal.

We call this "a last appeal" because such hearts as are not touched by generous impulses, by this time, are really beyond the reach of appeals of any kind.

In our June issue we announced that the ITEMS OF INTEREST Fund amounted to $5,160.00. We are now pleased to state that every pledge has been kept; every promised dollar paid in. Indeed to date we have done even a little better, having forwarded to Dr. Patterson $5,190.75.

One additional subscription it was a pleasure to receive. It came from Dr. Emile Schrier of Vienna, and is forwarded "as a slight token of remembrance of courtesies received in America." The sentiment does honor to Dr. Schrier, and we trust that the report of his thoughtfulness may induce some of the American dentists practicing abroad to remember the land of their birth and their suffering brethren.

But why should they, when so many men here at home seem oblivious of the dire necessities of those whom but yesterday we were so prone to call "brothers?" That brotherhood is but poorly knit together whose members cannot spare a dollar for aid. Yet thus has it proven. One

would have supposed that 35,000 dentists could easily have raised $100,000. Certainly not less than $35,000,00 was the rightful expectation; one dollar per capita. Yet only $12,000.00 has thus far been reported, about one dollar per capita if we measure only by the number of dentists affiliated with dental societies, for of the $12,000 between $2,000.00 and $3,000.00 came from dental goods dealers.

There would be some comfort in these meagre figures if at least every society member had sent something, but the truth is that while an honored few have contributed two or even three times, through various societies, the moneys received have really come from not over one-third of the society men. What of the other two-thirds? Brothers, have ye done your duty by our California brethren?

Dr. Root's Idea.

Here is an idea suggested by Dr. J. P. Root of Kansas, and may it take root, blossom, and bear fruit. Dr. Root writes that experience in his section has shown that a larger sum can be raised if dentists are asked for some of their "scraps," than where the appeal is for cash. Of course by "scraps," he means gold scraps, and he urges every one to start a spring cleaning of the laboratory, and then to send in the gold scraps as a contribution to the fund.

We heartily indorse Dr. Root's idea and have a supplementary hint to throw out.

To those who may hesitate to forward their nice clean gold clippings (though really they are just as acceptable as any kind) we would recall the fact that likely enough among their scraps there may be some that cost them nothing. Generous brother, hast thou removed any gold shell crowns? Any bridgework of other make than thine own? Are there any old gold plates about, discarded by patients? If so didst thou make reduction in thy bills for the benefit of the patients from whose mouths these "scraps" were taken? If not, brother, here is indeed a rare opportunity for generosity that will cost thee nothing. But, if thou wouldst have some credit in heaven as well as among thy fellow men, include a little of the clippings from thine own gold.

For once on a time, a penurious Quaker by accident dropped a gold piece into the hat, whereas he had meant to deposit a quarter of a dollar,

and finding that the gold piece could not be recovered, he sighed and consoled himself with the remark, "I'll get credit for it in heaven," but his brother replied, "Thee will get credit for the quarter of a dollar in heaven, but thy gold will do good on earth nevertheless."

To our dental brothers, who may be inclined to contribute to the "scrap pile" we make the promise not to scrutinize. Just look over your gold drawer, kind reader, and realize that what is lying idle there will help to re-establish a brother dentist, *at present starting practice with a* $20 *equipment*, which is all that the fund can thus far afford. Address your packages of gold to the Editor; and let us see how large a pile he can report by the next issue.

An Opportune Time for Reciprocity.

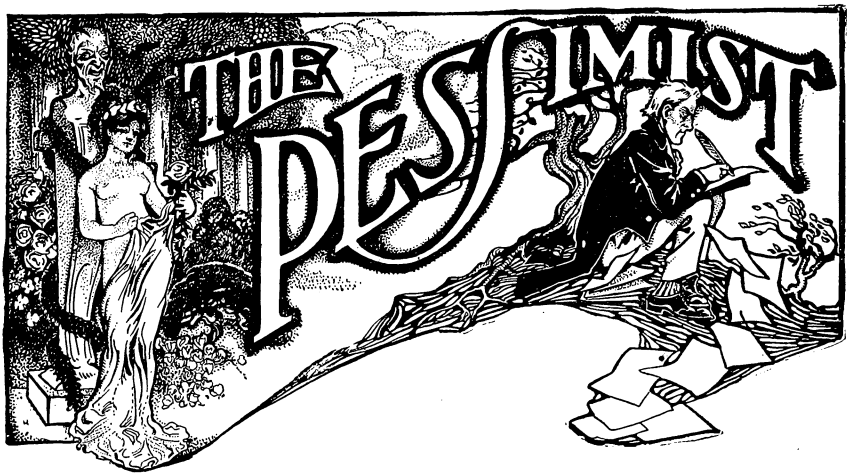
Editor, ITEMS OF INTEREST:

The dentists of San Francisco have our sincerest sympathy. By earthquake and fire some four hundred of them have lost their all, the makings and savings of a life time. It will be a long time before they can resume practice. The people will not be able to have dental work done for some time and many will have to seek other fields of practice. Doubtless they will turn to the East. The examining boards should extend the good hand. We remember that the California board has been very exclusive, but this should not count against the brother in distress. If California had adopted the interchange resolution, it would now be an untold blessing to many of them. The shock that shook the city apart should now shake our hearts together. We are secure to-day, we may be desolate to-morrow. To-day no thought of removal is ours, to-morrow we may have to seek another home. Let us then prepare for it by adopting the Asheville Resolution; let all agree to interchange with New Jersey and all the other States.

Yours truly,

CHARLES S. STOCKTON.

Newark, N. J.



NOMENCLATURE! There are one or two letters in that word that you can negotiate of course, because they are liquid sounds, but if you can pronounce the whole word without spilling any of the consonants, I'll admit you're sober.

GOOD! NOW, THAT you have pronounced the word, I pronounce you sober. Then I ask you to define it. Well? I'm waiting. I see! You can say the word but you can't tell me what it means, and you suggest that I tell you; then you wink at my Optimist friend. Yes, you did! I saw you! And you think you have me trapped. But say, Foolish One, do you suppose I would have mentioned the word without looking it up in the dictionary first? Go to! I'm not sure you are sober after all.

OF COURSE YOU are not interested in what the dictionary says; you can look that up for yourself. You want my own, my very own definition. Here it is. Nomenclature is that aberration of science which compels a dental writer to invent a new term every time he writes a paper.

IT IS SO MUCH easier to coin a new name than to discover a new disease.

ONE WOULD THINK one name would suffice for one thing; and that is not exactly a new idea either. Shakespeare mentions somewhere that ten names for a rose does not make it any rosier, or something to that effect. And surely a dog will come to one name more readily than to three or four. Fact is, if a Dog Friend of mine had a Fool-owner, that gave

him half a dozen cognomens, I would not use any of them on the Dog. If I wanted him, I'd just whistle.

MOREOVER, IT IS the same with dentistry as with dogs, in the last analysis. A dog is a dog, whether you call him a canine or a kioodle, and a disease by any other name takes just as long to cure. Sometimes longer.

A DENTIST SAYS to a patient, "Little Lady, I find a cavity in the distal proximal surface of your left upper central incisor." The patient being of Boston blood, and having been nourished with a properly sterilized mental pabulum from the day of her weaning to the day of her graduation from Bryn Mawr, turns an inquiring eye and a frowning forehead on that Dentist Fellow, and thus she speaketh: "Is that within the realm of the possibilities? Can a solid substance have so many surfaces and yet be in accord with the laws of physics? You see, Doctor, I have had the 'distal approximate' surface of that tooth filled once; and I have had the 'distal approximal' surface filled once. Now I learn that caries has attacked the 'distal proximal' surface. Can you make it clear to me? Of course I am only an ignorant little girl!" And that Dentist just hates to tell that girl that it is the same old place.

BUT WHEN THAT Bryn Mawr Graduate reaches home she hies her into the library, and she opes her dictionary, first at "D," and then at "P." And she finds that "distal" means "farthest away," and that "proximal" means "nearest to"; and she wonders what a distal proximal cavity is. And do you wonder that she wonders? And the next dentist she meets may tell her that she has a "posterior cavity in her superior incisor." But mark me! She will not believe it. She will think that an upper tooth with so many cavities must be an inferior tooth.

DID YOU EVER have a woman patient tell you the history of her life—of her teeth; I mean, though it is much the same in length; only in the life history of teeth there is nothing to conceal; you generally get the whole story. Well, that happened to me once, and truly it was an affecting narrative.

THE TALE OF WOE started thus wise. "Doctor," said she, "my trouble began when I was about thirty. I was living in Connecticut then and a dentist told me I had an incipient case of Riggs disease. Naturally I thought if Dr. Riggs invented the disease, I could not do better than

have him treat me. And do you know, the very next day Dr. Riggs died. Why really, when I saw that in the papers I felt as grieved as though I'd known the man. I was worried, too, because how was I to get cured if he was dead? But the next week a friend took me to her dentist, and right glad I was I went. He told me I did not have Riggs disease at all; that it was just gingivitis. And he said he would fix it up for forty dollars. And he did.

BUT IT CAME BACK. I remember I was in Chicago when I first noticed it, and I went to a dentist there. I told him right off that I did not have Riggs disease, only gingivitis. You see I did not want any mistakes made. I asked him if he could cure that, and he said he guessed he could, but he would have to look at my mouth first. Well, he probed around every tooth I had, and squeezed all the gums till the blood spurted, and finally told me I had interstitial gingivitis. Then I knew I was getting worse because before that I only had the plain sort. So I wasn't surprised when the bill was seventy-five dollars.

BUT IN BOSTON six months after that a dentist told me I had suppurative gingivitis. I looked up 'suppurative' in the dictionary, and then I squeezed my gums, and sure enough there was the pus. So I knew that dentist understood his business. One hundred dollars.

I WAS IN BOSTON a few years, and then I moved to New York. After a while I had to see a dentist. Can you imagine my feelings when he told me I had alveolitis? Well, I thought it was about time to have a consultation. I inquired around and I heard of a man that knew all about gum diseases, and then my worst fears came true. He told me, after the most casual glance, that I had phagigenic pericementitis, and wouldn't anybody in my place have gladly paid the two hundred and fifty dollars to be cured of that awful trouble?

BUT SOMEHOW I never seem to stay cured, or if I get rid of one disease in my mouth I straight away get another. Maybe I don't respond properly to treatment. However that may be, I later discovered that I had pyorrhea; and that grew worse till I had pyorrhea alveolaris. Fortunately, as I thought, it was only the kind called simplex, and it only cost me five hundred dollars to get rid of that.

ANOTHER DENTIST told me my trouble is constitutional and the only way to really cure it is with Prophylaxis; but I have tried ten drug

stores and none of them keep the stuff, so I concluded it must be a patent of his own. Then I went to-day to another dentist and he says now I have pyorrhea alveolaris complex, and a neighbor of mine, a very highly educated lady, tells me that that nearly always develops into 'loose-toothitis.' But, Doctor, I don't want to have that—I'll give you a thousand dollars if you'll only save me from that. You see, I've had so many diseases I am a little discouraged." Could you blame her?

WHEN A MAN LOSES his natural teeth, he generally gets some false ones, to make him look natural again. You see, if he can't look natural, he wants to look as natural as he can. That's an old story, a bit twisted, I know, but the falseness of teeth is an old story, too, and the funny fact is that false teeth are often twisted a bit to make them seem more natural, which proves there may be a few facts even in fiction.

WHEN IT HAPPENS to a man that he needs new teeth, it's a serious problem nowadays to decide just what he does want. He could have his teeth on a plate, of course, just like his grandfather did, and come to think of it, the old gentleman was quite a handsome figure of a man; and there are some that think the grandson resembles his ancestor—especially since he lost his teeth.

BUT HE WAS talking it over with a friend at the club and his friend, who is always up to date, said: "You don't want a plate. What you need is a prosthesis. That's the latest. What?" He does not exactly answer; he starts to smile, then remembers the fewness of his teeth, and the stifled smile looks like an expression of pain.

SO IT IS A CASE of a plate or a prosthesis. There are disadvantages about a plate, of course. The term is a bit indefinite. It might be the things he eats off, or the things he eats with. But as to a prosthesis, he is puzzled. None of his friends, except the fellow at the club, ever heard of one.

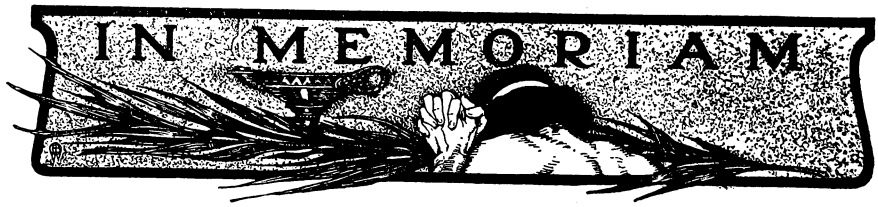
THEN HE REMEMBERS another fellow he knows, a fellow that usually knows everything, and sometimes even more than that. So he tells that man his troubles, and the man smiles benignantly and tells him all about it. "My boy," says he, "what you require is a denture. Want me to tell you the difference between a denture and—the other things? Why, certainly. If you want a 'plate,' you get it from a dentist, especially a mechanical dentist. No! a mechanical dentist is not exactly like

a mechanical doll; he's alive, though you'd hardly think it if you examine his works—his work I mean. He's the sort of fellow that gets fifteen dollars for making that plate that you pay your dentist fifty for. Now a 'denture' is made by the fellow himself, the fellow that takes your measure and also your money. He calls himself a Prosthodontist. And say, a denture will cost you anywhere from a hundred to five hundred; take my advice and leave your auto at home when you call on the Prosthodontist. But it's worse if you want a 'prosthesis.' You'll need a Prosthetist to make that, and there is only one at present in this country. And he is too far away for you to reach him in your auto. You'll have to take the steam cars."

* * *

POSTSCRIPT. I don't remember having a postscript before, so I may as well have one now. It just occurs to me that I could have written all of the above just as well about terminology as about nomenclature.

The Pessimist.



Dr. Charles A. Fuller.

At noon, on Saturday, March 17th, when the writer learned of the death of this fellow practitioner and former preceptor, great was the grief that came over him and as he telephoned the sad news to the dental profession of the city, sad and grievous were the words of regret which came back to him from those who had loved and held in high esteem their now departed fellow practitioner, Dr. Charles A. Fuller.

Three weeks' sickness with inflammatory rheumatism, which finally developed into cardiac and cerebral rheumatism was the cause of his death.

Dr. Fuller was one of the class of men who believed in the highest perfection at the cost of time in all his undertakings. He was born at Burrs Mills, near Watertown, N. Y., in 1868. He received his early education in the public schools and then entered a machine shop in Watertown where he completed his apprenticeship and became an expert mechanic. He became interested in the dental profession through a brother, a dentist, and in 1889 he entered the Iowa Dental College from which he graduated two years later and immediately entered into the practice of his profession in Watertown where he remained in active service to his ever loyal patients until three weeks before his death. In 1893 he was married to Miss Ida Greeg of Iowa City, Iowa. He leaves a widow and two children, a boy of eight years and a girl of five years.

His mechanical training in the machine shop together with his natural genius, his dental training and love for correctness, well fitted him for the practice of his profession. Mechanically he was superb. His success in artificial denture work was of much credit. His gold fillings were works of art and stability united. So in all his mechanical work he excelled and not alone was he good in mechanics but also well versed in theory and practice of medicine and operative work.

He was a charter member of the Jefferson County Dental Society in which he worked most faithfully, having capably filled the offices of treasurer, secretary, vice-president and president, besides having acted on various committees to advantage and having presented many valuable

papers and clinics. He was a member of the Fifth District Dental Society of the State of New York and ever conducted his practice on those principles for which these societies stand. He was a member of the Masonic Order and the Odd Fellows, in which organizations he was a stimulus and help. Plain, conscientious, faithful, sincere, ardent in work, he naturally built about him a pleasant clientele and the respect of the community and all who came in contact with him.

His death is the first to be recorded on the books of the Jefferson County Dental Society in the eleven years of its existence.

The funeral was held from his home, Rev. Dr. A. M. Brodie officiating. The Jefferson County Dental Society, the Masonic Order and the Watertown City Lodge of Odd Fellows attended the funeral. The services were under the direction of the Masons, six of his former dental colleagues acting as pall bearers.

W. H. LEAK, D.D.S.,
Watertown, N. Y.

Thomas Benton Atkinson.

Thomas Benton Atkinson was born in Brooks County, W. Va., April 2, 1838; died in St. Joseph's Hospital in Keokuk, Iowa, April 16, 1906, of uraemia. He came west in 1862 and settled in Rushville, Ill., where he commenced the practice of dentistry with his father Dr. Joseph Atkinson, formerly of Pittsburg, Pa. In 1868 he moved to Astoria, Ill., where he has since resided and continued the practice of dentistry. For the past five years he had been a great sufferer from gravel, and was finally operated on for same, but in his enfeebled condition could not overcome the poisons which finally took his life. Dr. Atkinson was married to Eliza J. Gamble, of Jamestown, Pa., 1861, and to whom six children were born; three of them, with the wife, survive—Dr. Charles M., dentist, of Havana, Ill.; John D., banker, of Astoria, and Miss Mabel, who resides with her mother. Dr. Atkinson was one of the oldest practitioners of the State, and continued some of his practice until the day before he was taken to the hospital.

SOCIETY ANNOUNCEMENTS

National Society Meetings.

American Society of Orthodontists, New York, December, 1906.
Interstate Dental Fraternity, Atlanta, Ga., Sept. 17.
Institute of Dental Pedagogics, Chicago, December 27, 28, 29.
National Association of Dental Examiners, Atlanta, Ga., September 14, 15, 17.
National Association of Dental Faculties, Atlanta, Ga., September 14.
National Dental Association, Atlanta, Ga., September 18.

State Society Meetings.

Maine Dental Society, Moosehead Lake, July 17-19.
New Jersey State Dental Society, Asbury Park, July 18-21.

New Jersey State Dental Society.

The New Jersey State Dental Society will hold their thirty-sixth annual meeting in the Auditorium, Asbury Park, N. J., commencing Wednesday, July 18, and continuing until Saturday, July 21.

New demonstrations, clinics and instructive papers the great feature of this meeting. Accommodations can be secured with the Hotel Columbia at a rate of $3.00 per day, two in a room, and $3.50 for one person in a room. Write early and secure your room.

A smoker will be given for the members, guests and exhibitors on Thursday evening, July 19, at 10.30.

The Pennsylvania and the Central Railroad of New Jersey carry passengers from all points to Asbury Park. Over eight hundred dentists registered last year.

Asbury Park is a splendid place on the sea shore to spend your vacation and the State Society offers instruction to help you in your work throughout the year. Cut off your appointments from the 18th to the 21st, and come and see for yourself.

CHARLES A. MEEKER, D.D.S.,
29 Fulton St., Newark, N. J.

National Association of Dental Faculties.

The annual meeting of the National Association of Dental Faculties will be held in Atlanta, Ga., commencing at 2 p. m., Friday, September 14, 1906. The Executive Committee will meet at 10 a. m. the same day.

H. B. TILESTON,
Chairman Executive Committee.

R. M. SANGER,
Secretary, Executive Committee,
East Orange, N. J.

National Association of Dental Examiners.

The twenty-fourth annual meeting will be held at the New Kimball House, Atlanta, Ga., commencing 10 a. m. Friday, September 14, 1906.

The rates per day will be on the European plan from $1.50 to $4.00; American plan from $3.00 to $6.00, governed by choice of rooms.

Convention hall will be in the hotel, and every effort will be made by the proprietors for the care and comfort of the members.

Arrangements are being perfected for reduced rates, for those desiring a short ocean trip, via the Clyde and Old Dominion Steamship Lines, notice of which will be given by circular later.

CHARLES A. MEEKER, D.D.S.,
Secretary and Treasurer.

29 Fulton St., Newark, N. J.

ITEMS OF INTEREST

Canadian Dental Association.

The Canadian Dental Association will hold its third biennial meeting this year in Montreal on the 5, 6, 7 and 8 of September.

C. F. MORRISON, Hon'y Secretary.

Montreal, Can.

Maine Dental Society.

The Maine Dental Society will hold its forty-first annual meeting at the Kineo House, Moosehead Lake, Maine, Tuesday, Wednesday and Thursday, July 17, 18 and 19, 1906.

Portland, Me. H. A. KELLEY, Secretary.

Wisconsin State Dental Society.

The thirty-sixth annual meeting of the Wisconsin State Dental Society will be held at Madison, Wisconsin, July 17, 18 and 19, 1906. The programme committe is arranging an unusually interesting programme. Some of the most eminent men in the profession will be with us and all indications point to one of the best meetings ever held in Wisconsin. All ethical dentists are most cordially invited to attend.

W. H. MUELLER, Secretary.

21 West Main Street.
Madison, Wis.

Michigan State Dental Association.

The Semi-Centennial meeting of the Michigan State Dental Association will be held in Detroit, July 9, 10 and 11, 1906. A most cordial invitation is extended to all reputable practitioners to attend this Fiftieth Anniversary of the Association, and a most interesting program is in preparation to celebrate this important occasion.

EDWARD B. SPALDING, Secretary.